DOCUMENT RESUME

ED 324 654 CS 010 273

TITLE Thinking about Reading about Thinking about Reading about Thinking. Advanced Skills in Chapter 1. Workshop. Leader's Guide.
INSTITUTION Advanced Technology, Inc., Indianapolis, IN.
SPONS AGENCY Department of Education, Washington, DC.
REPORT NO TAC-B-59
PUB DATE 90
NOTE 139p.
PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052) -- Guides - Non-Classroom Use (055)

EDRS PRICE MF01/PC06 Plus Postage.
DESCRIPTORS Elementary Secondary Education; *Inservice Teacher Education; Program Guides; Reading Instruction; Resource Materials; *Thinking Skills; *Workshops; Writing Instruction
IDENTIFIERS Education Consolidation Improvement Act Chapter 1

ABSTRACT

Designed to assist technical assistance center staff members and other inservice providers, this workshop leader's guide contains step-by-step procedures for preparing, organizing, and presenting a one-hour workshop on advanced skills for teachers, administrators, and others associated with Chapter 1 programs. Sections of the guide include: (1) an introduction, "getting started," and a workshop outline; (2) blackline masters for the participant handouts and overhead transparencies referred to in the workshop outline; (3) a brief overview of advanced skill topics; (4) resource articles and support materials including additional activities and suggestions; and (5) a 170-item bibliography of additional sources of information. (RS)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED324654

TAC-E-59

Advanced Skills in Chapter 1....

Thinking about Reading about Thinking about Reading about Thinking

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

CS 010 273

INTRODUCTION

What's in this Guide?

This Workshop Leader's Guide is designed to assist Technical Assistance Center staff members and other inservice providers in conducting successful workshops on advanced skills for teachers, administrators, and others associated with Chapter 1 programs. This guide contains step-by-step procedures for preparing, organizing, and presenting a one- (or one-and-a-half) hour workshop on advanced skills.

Contents:

Section 1 includes the **Introduction, Getting Started,** and the **Workshop Outline.**

The **Getting Started** section includes an Advance Planner and a detailed checklist for materials and equipment needed to conduct a successful workshop on advanced skills .

The **Workshop Outline** includes detailed instructions for presenting a one-hour workshop including the goals of the workshop, specific activities, and recommendations for using the overhead transparencies and participant handouts. The outline for the one-hour workshop can be expanded to provide the basis for a workshop up to three or more hours in length.

Sections 2 and 3 contain the blackline masters for the participant handouts and overhead transparencies referred to in the **Workshop Outline.**

Section 4, the **Background** section, gives a brief overview of advanced skills topics with which you should become familiar.

Sections 5 and **6** contain **Resource Articles** and **Support Materials** including additional activities and suggestions for presenting a workshop on advanced skills.

Section 7 includes a **Bibliography** of additional sources of information.

How to Use this Guide

This Guide contains the planning and presentation materials necessary to conduct a successful workshop on advanced skills. The materials were developed to allow a great deal of flexibility. Suggestions for workshop variations and a variety of activities are included so that the workshop can be adjusted to fit the needs and backgrounds of the participants. A wide range of approaches, types of activities, and specific research can be used in the actual workshop presentation. You may choose to change, add, or eliminate an activity or transparency. The sections in the Workshop Outline are well suited for expansion or contraction, depending upon your presentation needs.

Getting Started

Begin your advance planning for the workshop by establishing some of the initial details, such items as date, place, and type of audience. (See **Advance Planner,** a simple checklist for planning a workshop, p.4.) Then begin studying the contents of this guide by following the ***G-U-I-D-E*** steps outlined below: *Glance, Understand, Investigate, Develop,* and *Edit.*

G-U-I-D-E

- *Glance* through the entire set of materials. This will give you a feel for the types of materials contained in the Guide (and their location) when you study the details later.

- *Understand* as many of the materials contained in the Guide as possible. Plan enough time to develop a full grasp of the materials in order to make more informed decisions about your workshop presentation.

- *Investigate* further. You may want to do additional research, try different problems, or experiment with various activities.

- *Develop* additional materials. These may be workshop notes, transparencies, handout pages, activities, or any item resulting from your "investigating" activities.

- *Edit.* Look carefully at the total picture, then elaborate or eliminate, if necessary.

Begin planning as soon as possible. Even if you use only the materials in this Guide, the ***G-U-I-D-E*** steps will take time and should be included in your planning. It is especially important to allow yourself the opportunity to thoroughly explore and review the activities in the **Workshop Outline** so the purpose and strategies for each activity will become more apparent to you. In addition, as you engage in the activities, you are likely to discover that you need or want to try additional activities from several sources. (See Section 6, **Support Materials**.) You may find that these materials are better suited to your particular workshop and, therefore, you may want to substitute them for other workshop materials in earlier sections of this guide.

What You Need for the Workshop:

EQUIPMENT

____ Overhead Transparency Projector
- ___ extension cord
- ___ 3-way plug adaptor
- ___ extra bulb or spare projector

____ Blank Overhead Transparencies

____ Screen

____ Microphone (if needed)

MATERIALS

____ Workshop Outline

____ Supporting Notes

____ Participant Handouts (one for each participant from Section 2)

____ Overhead Transparencies (prepared from masters in Section 3)

SUPPORT MATERIALS

____ Chart paper

____ Poster board

____ Marker and tape (or chalkboard and chalk)

Before You Begin

Make copies of the overhead transparencies you plan to use in the workshop, and be sure you have one copy of the handouts for each participant. If you are presenting the workshop in a location with which you are unfamiliar, ask the local contact person to be sure the equipment listed above is available and in working order on the scheduled day and time of the workshop. If you will be supplying your own equipment, make arrangements for obtaining it well in advance of the workshop and make sure everything is in working order.

Workshop Advance Planner

Presentation Information

Title _____

Date _____ Day _____ Time _____

Place _____

_____

Audience Type _____ Number _____

Purpose _____

Contact Person _____ Phone _____

Planning Task	Date Completed
Contact Person(s) for Planning	
Confirm Date, Time & Place	
Make Travel and Hotel Plans	
Arrange for Equipment	
Send Workshop Agenda to Contact	
Personalize Workshop Outline	
Other _____	

STRIVING FOR MORE:
Advanced Skills in Chapter 1

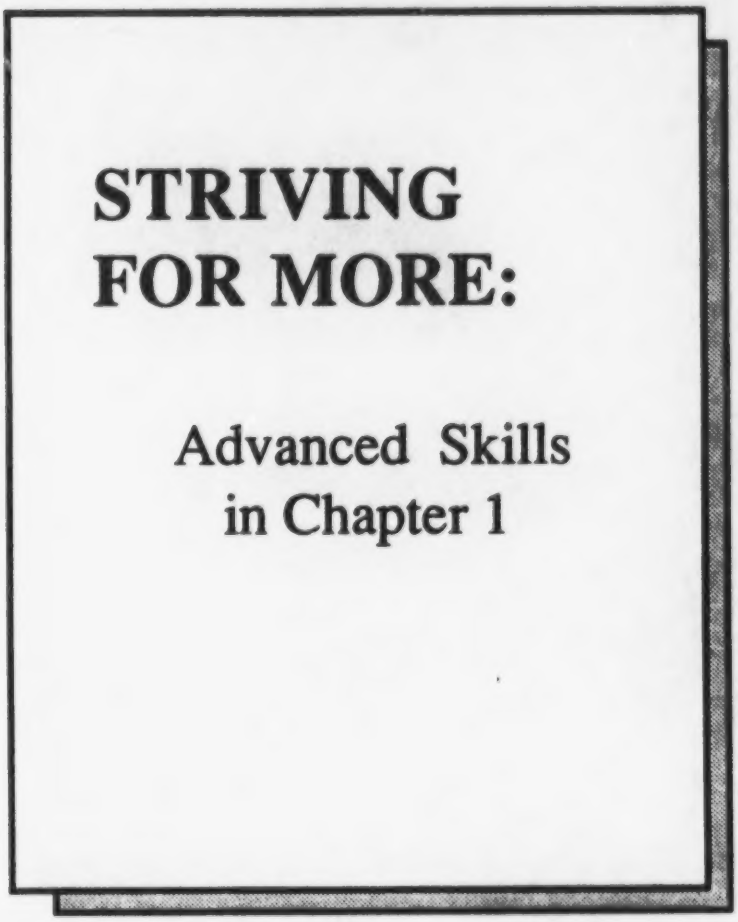
Workshop Outline

Introduction/Overview	**5-10 minutes**
Advanced Skills	
"Why?"	**10-15 minutes**
"What?"	**10-15 minutes**
"Wherefore?"	**25-35 minutes**
Summary and Conclusion	**10-15 minutes**

(Please note: While this workshop is part of the one-hour workshop series, there is enough material to extend it easily to one-and-a-half or even two hours.)

Introduction/Overview

(5-10 minutes)

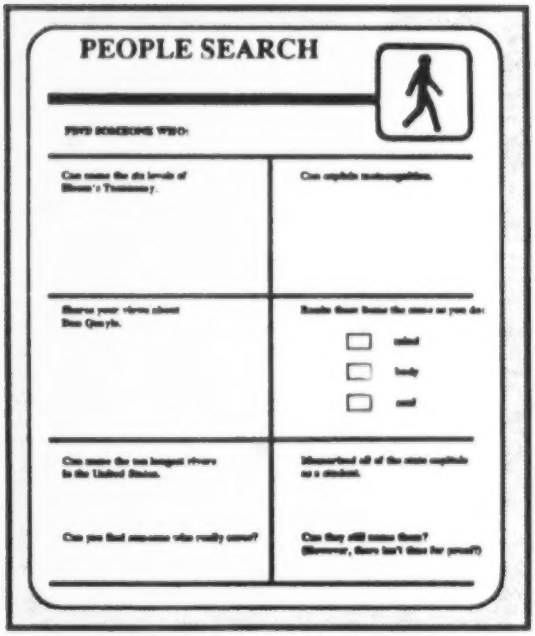


Display T-1: Workshop Title Slide:
"Advanced Skills in Chapter 1"

ICEBREAKER

Procedure:

If you need a warm-up activity for the workshop participants, and if you have time and space for a get-up-and-move-around type activity, distribute copies of Handout 1, *People Search*. This activity requires participants to walk around the room looking for people who meet the criteria specified on the *People Search* handout. The criteria are designed to help participants compare and contrast different types of thinking. After they have spent enough time gathering information and meeting people, call the group back together to briefly discuss their observations and experiences during the activity.



Activity

"People Search"

Introduce yourself and describe your association with Chapter 1. Use "People Search" (found at beginning of Handout section) to encourage participants to interact. (If you don't have time or space for this activity, skip to the Opening Activity, p.8.)

Opening Activity

- Introduce the workshop by stating that the first purpose of the workshop is to discuss what is meant by "advanced skills" and why the concept is important.

- Identify the second purpose as the presentation and discussion of ways that Chapter 1 teachers can make the teaching of advanced skills an integral part of their Chapter 1 instruction as well as a complement to the instruction that students receive in the regular classroom.

- Introduce the opening activity by asking participants to engage in a process that, for them, is automatic and one that they take very much for granted: reading. Explain that you will use this activity as a foundation on which to build workshop information. (While this activity really helps to set the tone and build a basis for the workshop, it can easily be deleted if time does not permit.)

Procedure:

1. Read the selection on page 1 of the Handout-- "Discus Thrower." Note that there is blank space next to the selection.

2. As you read the passage to yourself, make notes in the blank space about things that go through your mind as you're reading. These "thinking notes" should be ones that are stimulated by the passage itself, not ones that represent "wandering thoughts" if you happen to get off task.

3. When you have finished, you will be asked to share some of your notes about the thinking strategies you used when reading. (You will make notes about their comments on a blank transparency, so it will be necessary to be prepared with a transparency and marker.)

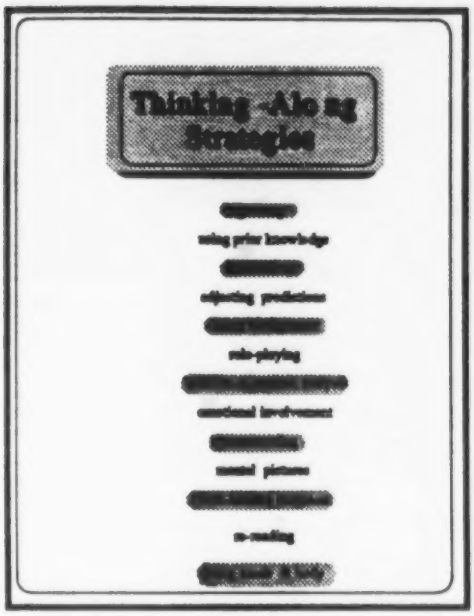
- When all or most of the participants appear to be finished reading, ask them to share some of their notes. If possible, you may want to try to organize this information on the overhead transparency according to thinking strategies. For example, thinking strategies (listed on T-2) may include:

- PREDICTING

- USING BACKGROUND

- MAKING MENTAL PICTURES

On the transparency you should *not* list these categories, but you might want to organize the comments with these strategies in mind. (This process facilitates the next discussion, but you can also do it without going through the categorization and just listing them. Then when participants discuss the strategies, they can find those on the list that reflect the particular strategy.)



Display T-2: "Strategies used in Thinking Along"

Review the strategies listed and find notes on the transparency list developed above that reflect each of the strategies. If you do not find an example for a particular strategy, ask the participants to think about whether they used the strategy and to share that information. (For example, they might not make a comment that indicates they "guessed the meaning of a word". But if you ask them if they did that, they often recall an instance during their reading when they did.)

Make the point that the strategies they used are "advanced skills" or the ones that we want to help children to master in order to be truly effective readers. Reiterate that one of the purposes of the workshop is to discuss teaching strategies that will make that possible.

Experiencing the workshop:

Encourage participants to think about their workshop experiences in three ways, as a:

Participant

experiencing the feeling of satisfaction that comes from successfully completing workshop activities

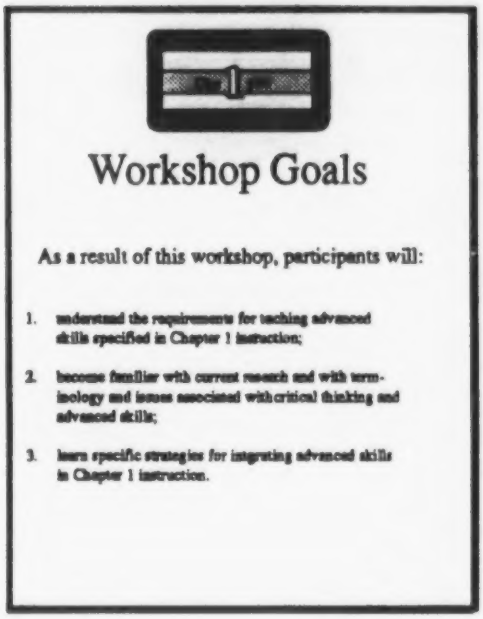
Teacher

learning about advanced skills and how to help students attain them

Student

developing an awareness of advanced skills and the feeling of success that accompanies their attainment

Workshop Goals


Workshop Goals
As a result of this workshop, participants will:
1. understand the requirements for teaching advanced skills specified in Chapter 1 instruction;
2. become familiar with current research and with terminology and issues associated with critical thinking and advanced skills;
3. learn specific strategies for integrating advanced skills in Chapter 1 instruction.

Display T-3: "Workshop Goals"

Present the goals of the workshop. Display the transparency that contains the goals for workshop. Discuss the goals of the workshop and how they are related to the Chapter 1 law and Chapter 1 program design. Both workshops include the activities in the one-hour workshop. The three-hour workshop includes additional information and activities that make it possible to extend the workshop to three hours.

One-hour Workshop

The one-hour workshop introduces participants to research and practical theory on advanced or higher order thinking skills. As such, it provides the basis for the three-hour workshop. One hour is the minimum amount of time in which you can present information on advanced skills in a manner that allows participants to assimilate and integrate the findings of recent research and current theory into their instructional practices.

Three-hour Workshop

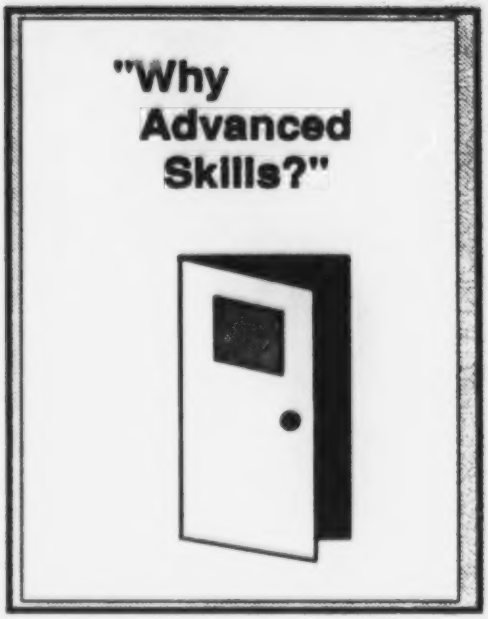
If additional time is available, the length of the one-hour workshop can easily be expanded to one-and-a-half hours by using additional examples and illustrations, allowing more time for discussion. In the one-hour workshop, four strategies are presented in a very brief format. The three-hour workshop incorporates additional strategies, and these are expanded further in the advanced skills modules.

Distribute Participant Handouts

Distribute copies of the Participant Handouts. Remind participants that most transparencies are reproduced in smaller size in the handout, so they should not feel compelled to copy what appears on the overhead projector screen. Explain that the workshop is divided by a discussion of the "why, what, and wherefore of advanced skills."

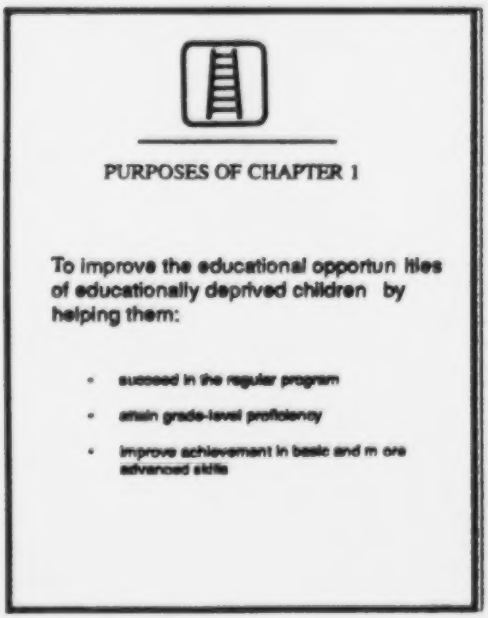
"Why " Advanced Skills ?

(10-15 minutes)



Display T-4:"Why Advanced Skills"

This transparency introduces this part of the workshop. Emphasize that it is most important to couch a discussion of the teaching of thinking or advanced skills in an understanding of why it's important or necessary to engage in such teaching, particularly in Chapter 1 programs.

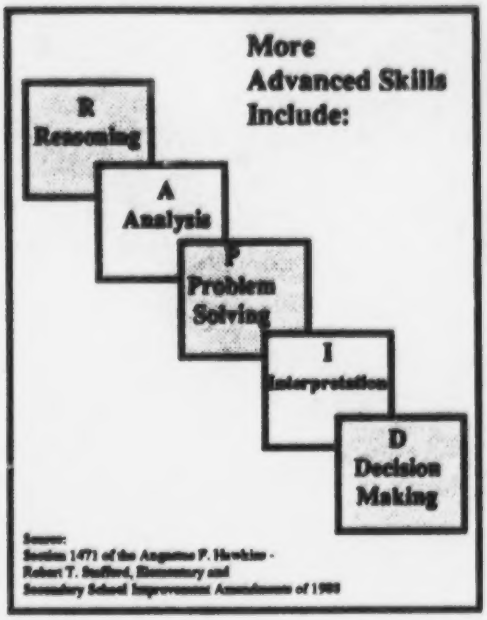

PURPOSES OF CHAPTER 1
To improve the educational opportun ities of educationally deprived children by helping them:
• succeed in the regular program
• attain grade-level proficiency
• improve achievement in basic and m ore advanced skills

Display T-5: "Purposes of Chapter 1"

Remind participants that under the reauthorization of Chapter 1, it was deemed important to include language that specifically states that improving achievement in both basic and advanced skills must be a purpose of Chapter 1 programs.

"Advanced skills" is defined in Section 1471 of the Augustus F. Hawkins-Robert T. Stafford Elementary and Secondary School Improvement Amendments of 1988 (Handout, p. 9):

"The term 'more advanced skills' means skills including reasoning, analysis, interpretation, problem-solving, and decision making as they relate to the particular subjects in which instruction is provided under programs supported by this chapter."

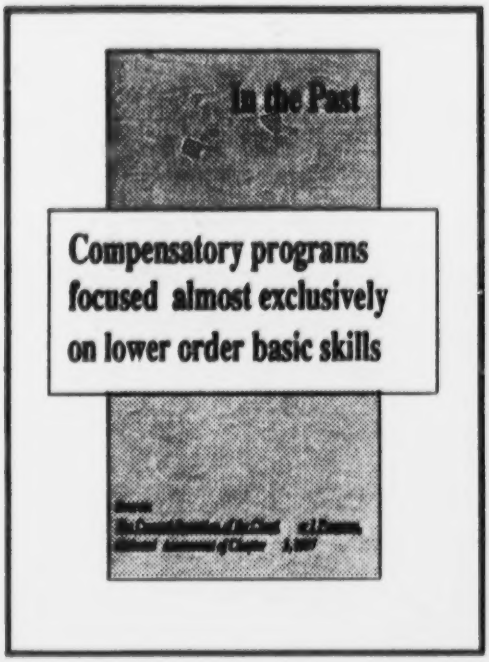


Display T-6:"More Advanced Skills"

Discuss the fact that the acronym, "R.A.P.I.D." is being used as a reminder of the "advanced skills" listed in the law. Emphasize the point that while it serves as a mnemonic to help us remember the skills defined in the law, it should not be considered to be a complete framework for critical thinking.

Display T's 7-13 (pp. 13-16) as you discuss background research.

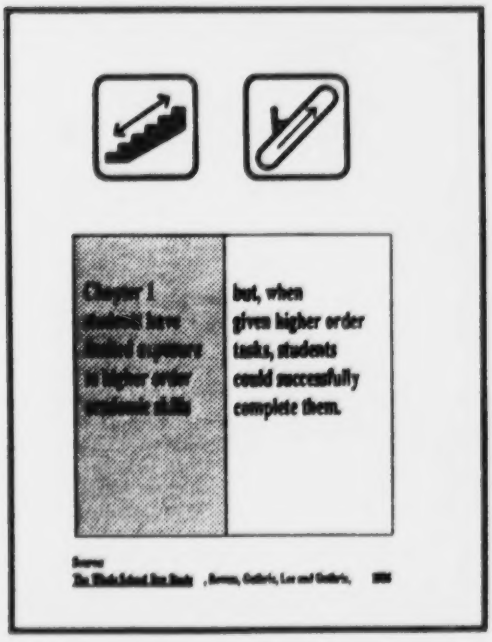
Mention research on Chapter 1 (see background paper for details) and the findings that demonstrate that Chapter 1 programs have tended to focus on lower order skills or "the basics", making it difficult, if not impossible, for Chapter 1 students to catch up.



Display T-7: "In the Past... "

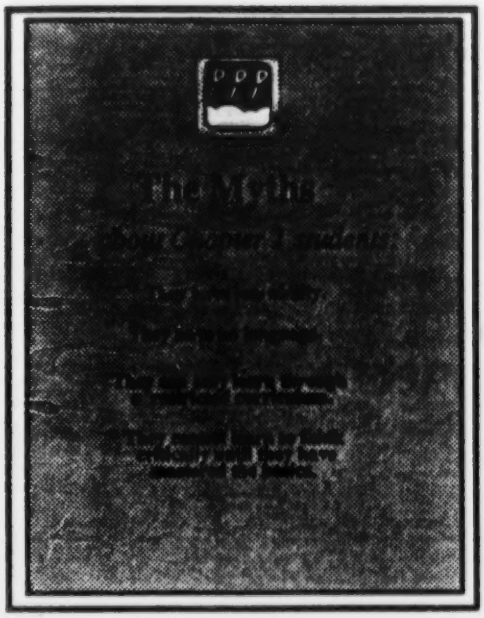
Romberg (1986) has stated that instruction in Chapter 1 programs is "defined by the workbooks and judged by the tests." The curriculum often "systematically underchallenges" the disadvantaged student. Continual drill and repetition of basic skills limits Chapter 1 students' opportunities to progress to more challenging material.

Recent research indicates that the traditional emphasis on drill and practice, isolated reading skills, and math facts in Chapter 1 instruction is unmotivating, and that effective reading and math instruction integrates advanced thinking skills as inseparable from subject area content.



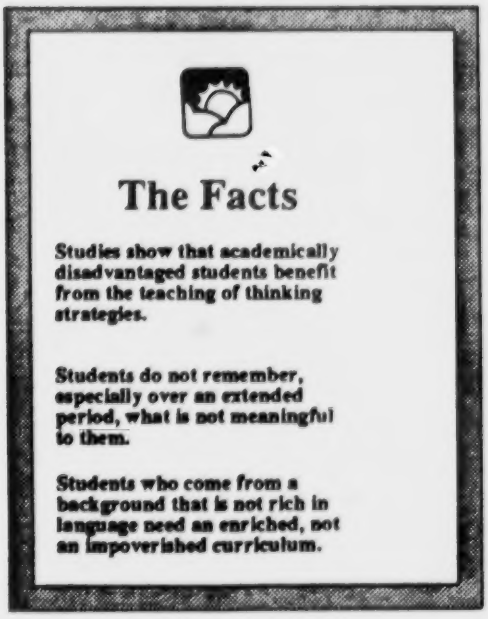
Display T-8: "Chapter 1 Students"

In "Better Schooling for the Children of Poverty" (SRI, 1990), the point is made that disadvantaged students will be better able to meet the academic challenge of school if "the academic program allows and encourages students to draw and build on the experiences they have, at the same time that it exposes them to unfamiliar experiences and ways of thinking." It states further that the culture of the school--the assumptions, expectations, and ways of doing things in school--must be "made explicit to these students by teachers as they explain and model these dimensions of academic learning."



Display T-9: "Myths about Chapter1 Students"

Identify some of the myths about Chapter 1 students that need to be dispelled and some of the strengths that need to be emphasized. Programs for disadvantaged students are often couched in the perception that these learners lack information and intellectual facility. Knapp et al. (1990) state that "a great deal of research and practice has been predicated on the assumption that 'disadvantaged' students are deficient in ways that influence their performance in school." The assumptions about these children "locate the problem in the learner and his or her background."


The Facts
Studies show that academically disadvantaged students benefit from the teaching of thinking strategies.
Students do not remember, especially over an extended period, what is not meaningful to them.
Students who come from a background that is not rich in language need an enriched, not an impoverished curriculum.

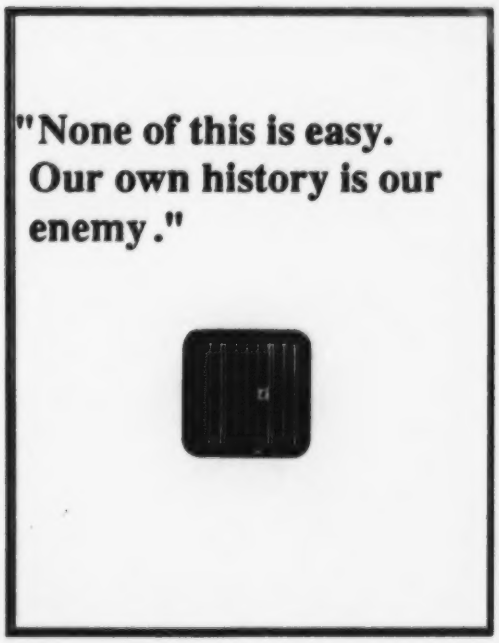
Display T-10: "Facts about Chapter 1 Students"

"The disadvantaged child brings to school speech patterns, cognitive experiences, and behavior patterns that do not match the way things are done in school" (Knapp et al., 1990). They, therefore, face a difficult learning task--learning the culture of the school at the same time that they are trying to master the content.

Point out that recent cognitive research has found that the beginning or "naive" learner actively develops theories about the way the world works, just as the advanced or expert learner does; it implies that disadvantaged students "come to school with more sophistication and more active, inquiring minds than deficit models may presume" (Knapp, 1990).

Display T-11 : "Thinking can be taught"

Discuss briefly the fact that while evidence has been accumulating for decades to support the fact that thinking can and should be taught in our schools, barriers to doing so have not been overcome.



Display T-12: "None of this is easy"

Mention several of the barriers that have existed in our educational system that have made our schools remarkably resistant to any efforts to include the teaching of thinking. (See box on next page.)

Barriers to Teaching Thinking: Questions to Consider

Has our school system or society as a whole ever really accepted the notion that helping students to become independent thinkers should be a primary educational goal?

Public schools have inherited two educational traditions --one aimed at the education of the elite and one aimed at the masses. Which has it followed more closely?

The first tradition has always embraced the teaching of higher order cognitive skills, while the second has been concerned with the production of minimal levels of competence. How often have we had a "back to the basics" movement? The problem is that in our society there is a new definition of what is minimal competence or what is basic.

The teaching of thinking has been viewed as something that is distinct from, and should follow "the basics". The idea seems to be that students must first be given a solid foundation in some enabling competencies and then they can be taught to think. Investigators now challenge this notion by arguing that the ***basics*** and ***thinking*** are not, in practice, separate; or to put it another way, that ***thinking is basic to the basics.***

(Nickerson)

- Emphasize importance of understanding that what is new about the current growing interest in the teaching of higher-order cognitive skills in the public schools is not the inclusion of thinking, problem solving, and reasoning in someone's school curriculum but the idea that these things should be included in everyone's curriculum (Resnick, 1987).

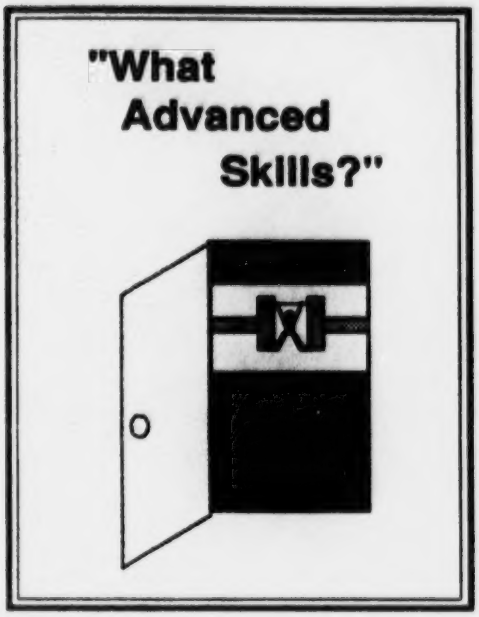
QUESTIONS

- **Do we really want students to think?**
- **Do we want them to become more critical and more questioning and less likely to accept things at face value?**
- **Do we want more critical debate and less reliance on the teacher?**

Display T-13: "Questions to ask Ourselves"

Point out that teachers must ask themselves important questions before they approach the teaching of thinking.

"What" Advanced Skills?



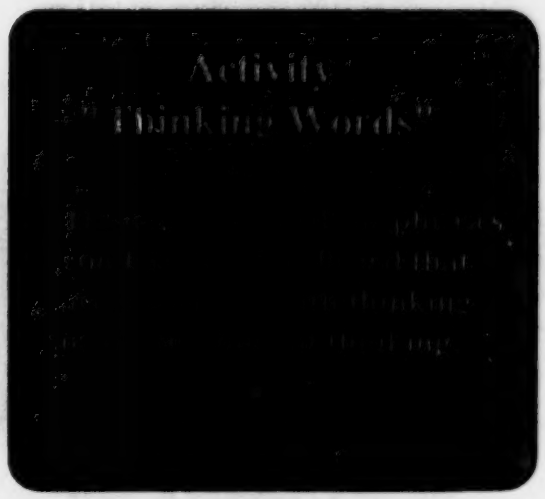
Display T-14: "What Advanced Skills?"

Point out that as is often the case with "trends"--particularly educational trends--there is considerable disagreement about the terminology associated with "advanced skills." Such skills are variously referred to as critical thinking, creative thinking, higher order cognitive skills, and higher order thinking skills, or "H.O.T.S." for short.

Activity

"Thinking Words"

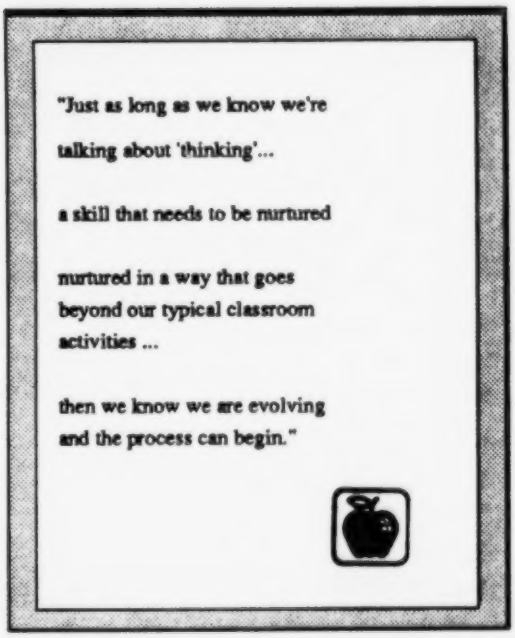
Brainstorm briefly with the group the words that they have heard associated with thinking. List these on a chalkboard or blank transparency if you wish. Discuss how people heard these terms, what they think they mean, and how they have used strategies represented by these terms in their instruction.



- Mention that while it is not very productive or useful to get lost in a web of jargon, agonizing over what terms to use or debating definitions, some words that have come into common use are, in fact, very useful and lead to important changes in teaching. A good example is "metacognition", a word that is discussed in detail later in the workshop.

- Note also that many researchers have devised frameworks for organizing categories of thinking skills, the "grandfather" being "Bloom's Taxonomy".

- Point out that each of these frameworks has benefits and limitations and that it is unlikely that choosing one over another will make a significant difference in children's learning.

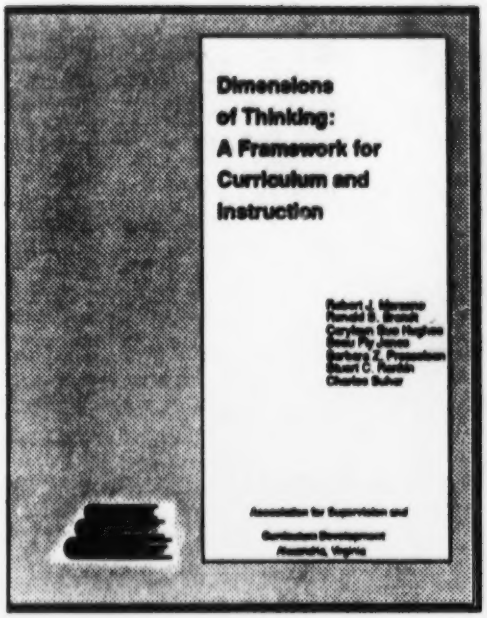

"Just as long as we know we're
talking about 'thinking'...
a skill that needs to be nurtured
nurtured in a way that goes
beyond our typical classroom
activities ...
then we know we are evolving
and the process can begin."

Display T-15: "Just as long as we know ..."

Discuss the importance of knowing that thinking must be included in the curriculum. As long as teachers give consideration to the skills or strategies included in such frameworks--that they *think about thinking* and begin to structure their teaching in ways that incorporate the teaching of thinking.

- State that in the interest of presenting some well-organized ideas for integrating advanced skills in Chapter 1 teaching, the framework developed in the ASCD publication, ***Dimensions of Thinking***, was chosen to serve that purpose.

Refer participants to the Handout, pages 10-13, to review the outline from the ASCD framework that is being used.



Display T-16 : "Dimensions of Thinking"

Explain that while the framework is comprehensive, it should not be treated as a tool for "management by objectives." In other words, the thinking skills should not be considered as a hierarchy of isolated skills that need to be mastered by students one at a time.

Encourage participants to review the outline often in order to give consideration to the types of thinking they should encourage in their students and integrate in their teaching.

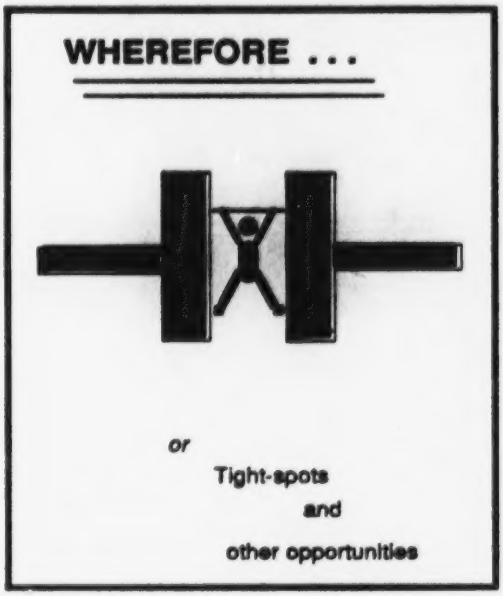
- Explain that the remainder of the workshop is dedicated to an elaboration of four of the strategies listed under the first four categories of the framework.
- Mention also that the thinking strategies and teaching procedures presented are structured around the idea of a "thematic unit." Explain that focusing on a theme and organizing instruction around this theme is a viable approach for Chapter 1 teachers and one that will help them move away from the idea of structuring their lessons around a set of skills and objectives or around a particular skilltext.
- The theme that establishes the thread of continuity in this workshop is:

TIGHT SPOTS

"Wherefore" Advanced Skills ?

or...

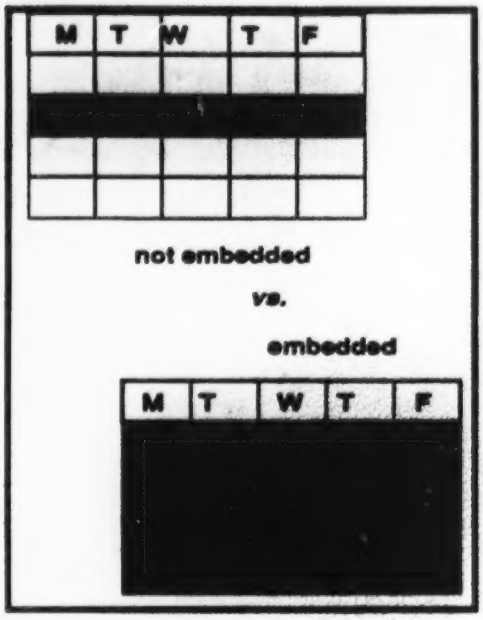
"Tight Spots and Other Opportunities for Teaching Advanced Skills "



Display T-17 : *"Wherefore ...?"*

Explain that this part of the workshop will deal with the development of an awareness of thinking skills and how to integrate them with daily instruction.

Mention that the use of a unifying theme in instruction (in this case, ***"Tight Spots"***) can help to move teaching away from being textbook-driven. Instead of a page-by-page or skill-by-skill focus, instruction can effectively be planned around the use of tool skills like reading and writing to learn about topics, issues, themes, and concepts.



Display T-18 : "Embedded or Not?"

Discuss the fact that in addition to the issue of which framework or terminology to use as a basis for teaching thinking, one very controversial issue has been whether to teach thinking skills *separately from* or *integrated with* the curriculum. (Review background paper for information about two sides to the argument.)

Question is: **Is thinking best taught in a content-free way?**

"It seems then the need is to both teach thinking in the abstract to ensure that students are aware of specific aspects of thinking and also teach traditional courses in such a way as to illustrate the applicability of good thinking in those contexts and to provide daily opportunities to exercise it."

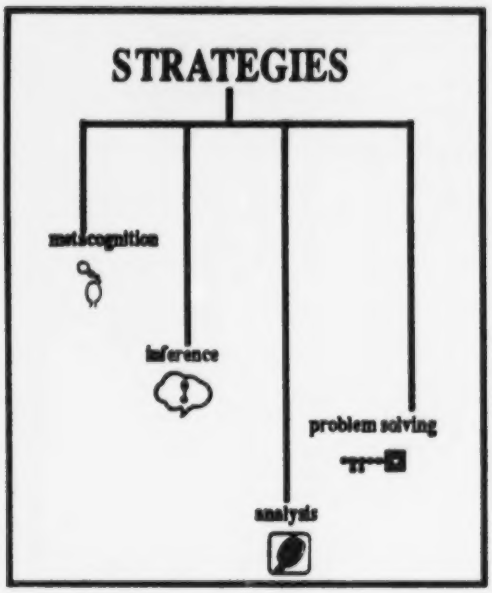
Ray Nickerson

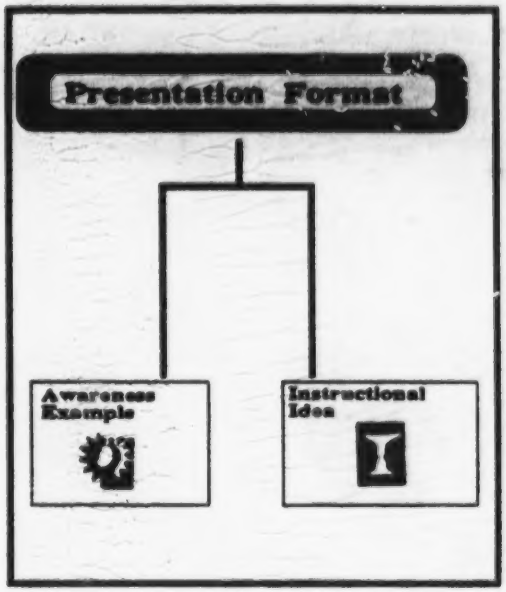
Review Nickerson's point of view as presented in the Handout, p. 9. Emphasize that the time contraints of typical Chapter 1 programs and the need to coordinate with regular classroom instruction probably necessitate instruction which integrates thinking. However, adding activities that teach thinking in the abstract when there is the time and opportunity to do so should be considered.

Introduce questions about a school's curriculum. Does the curriculum in your school include learning how to divide? Does it include learning how to infer? Does it include dividing words into syllables? Does it include learning how to multiply? Does it include learning how to compare? To generalize? To prioritize?

- Emphasize that many assumptions are made about skills that students are expected to utilize. For example, they may be asked to ***draw a conclusion*** in a science class, yet they have not usually been taught how to use that skill. We assume that students know how to perform the basic thinking skills involved in learning subject matter, but this is often not the case.

- Point out that there is substantial research that demonstrates that academic achievement increases when thinking skills are taught directly (DeBono, 1984; Whimbey, 1985; Feuerstein, 1980).





Display T-19 : "Four Strategies"

Explain that the format for the remainder of the workshop is based on the selection of four thinking strategies from the *Dimensions of Thinking* framework:

Metacognition | ***Inference*** | ***Problem-Solving*** | ***Analysis***

Display T-20 : "Presentation Format"

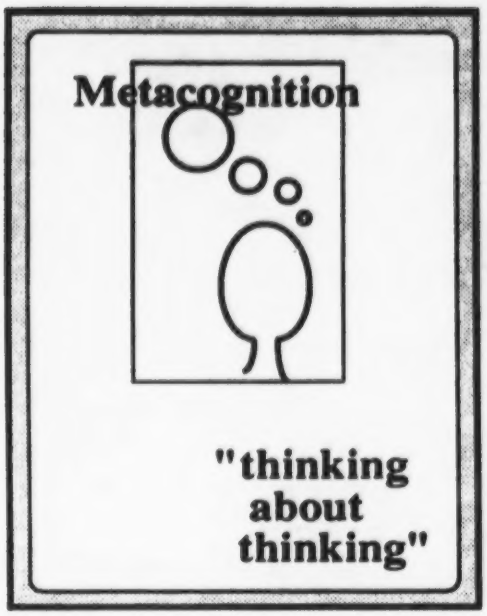
Describe the presentation format:

1. Four thinking strategies are highlighted.

2. Each one is presented first through an example that will illustrate the thinking skill or make participants aware of the particular thinking strategy.

3. Each thinking skill is then presented through an instructional idea that describes a teaching strategy designed to encourage the development of the thinking skill.

Display T- 21 : "Metacognition"



Ask participants to respond to a question such as:

"How much is one-half of twenty plus twenty divided by two and added to the number of planets in our solar system?"

Ask whether they "heard" themselves talking to themselves, asking questions, thinking about how to approach the problem. Have a few participants describe what they were thinking

Identify this "inner dialogue" as the experience of ***metacognition*** or *thinking about one's own thinking*. Explain that it is a key attribute of formal thought and that despite the fact that it is a skill that comes into fruitful use around age 11, there are many adults who do not "metacogitate" because they have not learned or been taught the value of doing so.

Note about students who have difficulty learning:

A notable problem in students who have had difficulty learning to read or to do math is that they try to follow instructions or perform tasks without wondering why they are doing what they are doing. They seldom question themselves about their own learning strategies or evaluate the efficiency of their own performance. Many have virtually no idea what they should do when confronting a problem and are often unable to explain their decision-making strategies. Individuals who possess well-developed metacognitive abilities are those who "manage" their intellectual resources well.

Refer participants to Passage 2, Handout, p. 5, "Vehicle". (Alternate passage 3 also on page 5.) Ask them to read the passage and tell them that you will discuss how they read it after they have finished.

- Elicit oral descriptions of how they went about "solving the problem" of what the passage meant. You may want to use questions or strategies such as those listed on the following page.

1. Before you started reading, what was the main question in your mind? ("What is this about?") Mention that this is an important question that drives the meaning-seeking goal of an effective reader.

2. Ask someone to state what they thought the passage was about. (Usually a person who is willing to say is confident that it is about ***a boat or a see-saw***. However,if someone states something else, the idea is always to encourage risk-taking, so the response should be entertained as a viable one.) At what point did you predict that it was about _____? After you made that prediction, what did you do? Did anyone do anything else? (There is usually a split in this response: some go back to check meaning; others go on.)

3. Use these responses to discuss the fact that they illustrate the variation in readers' approaches to what they are reading, that it is important to monitor one's own strategies, use them flexibly, know when they are not working, and how to use "fix-up" or "repair" strategies when they are not working.

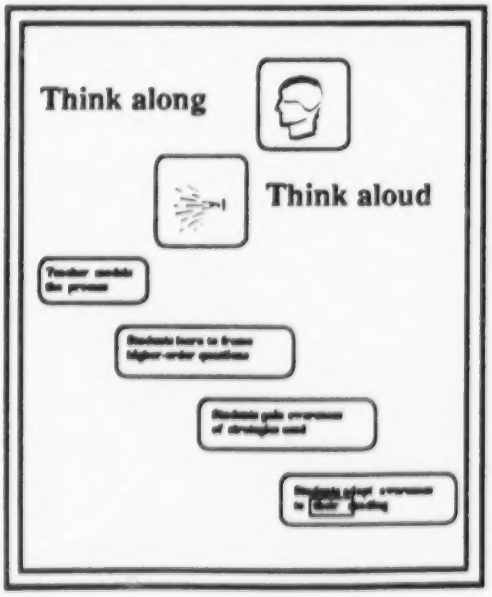
4. Ask others to comment on how they approached or proceeded through the passage. Use this opportunity to have them "make their thinking public". Point out that being able to describe strategies used is what is meant by "metacognitive awareness", that it is a vital part of being an effective reader, and that it can be "taught".

5. After discussion, show pictures on T-21a or T-21b to clarify meaning of passage.

Display T-22 : "Think-Along"

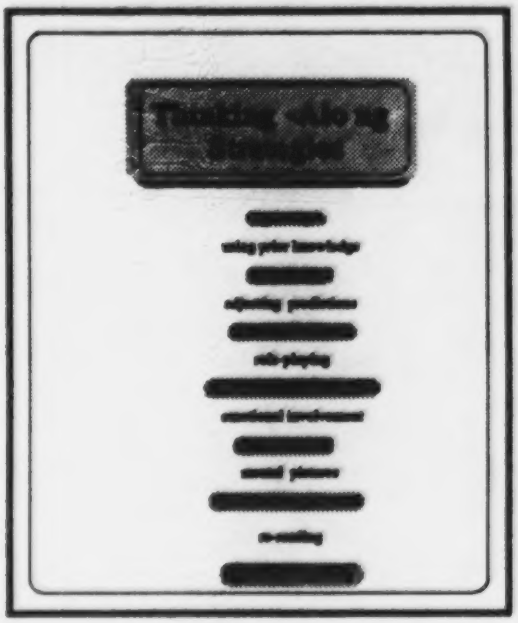
Refer participants to Handout, pp. 14-16. Explain that the procedure--generally described as "think aloud to think along"--is a simple instructional tool that is proving to be very powerful. Review steps and give the following strengths of the procedure:

- The teacher *models* the process for students. "Modeling" is a teaching approach that has gained considerable research support in recent years.
- Students hear the teacher *making thinking about the process public* and gain some awareness of the strategies used during the reading process.
- Students use their *awareness* of strategies to demonstrate the process and to *apply* to their independent reading.



Display T- 23: "Thinking-along Strategies"

If you feel comfortable, demonstrate the "Think-along" briefly for the group. You might also ask them to form pairs or small groups and try it on each other, using a passage from the handout (e.g., Passage 8, "And the Rock Cried Out.")



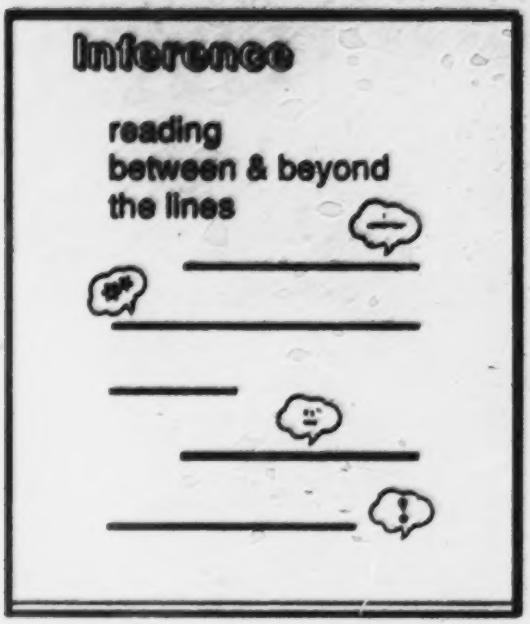
(It's a good idea to practice a bit before trying the "Think-along" in front of a group, but take the risk. It's not that difficult, and it's very effective!)

Review the list of thinking-along strategies on T-2 , making references to passages they have read in the workshop. Or if you demonstrate or have participants practice the strategy, remind them to think about the strategies listed and to identify them when they hear somebody using them.

If time allows, mention other teaching ideas for developing metacognition from the SUPPORT MATERIALS section.

Display T-24 : "Inference"

Identify "making inferences" as a vital strategy used continuously in effective reading.



Make the Following Points:

1. Making inferences involves making *deductions* and *inductions* from the material presented--or to state it in traditional terms--reading between and beyond the lines. If one is reading effectively, it is a strategy that is used consistently and is an integral part of the process. It is, of course, also used in the process of working with numbers where inferences are required in order to solve problems.

2. Inferences that a reader makes often become an integrated part of what they recall or the meaning they construct from what they read. This "inferential" information is difficult to separate from what is actually presented on the printed page.

Activity

Have participants read Passage 4 from Handout, p. 6. Ask them to make notes as they read or after they have concluded their reading about inferences they made. (If time allows, try it again with Passage 3. Using two different ones gives participants the opportunity to think about different types of inferences that are made.)

When they all appear to have finished the assignment, ask them to share some of the inferences they made and list them on a blank transparency or on a chalkboard. Ask for comments about inferences. Discuss whether they are logical, legitimate, etc.

To help support students' efforts to make inferences during reading, teachers should:

1. Help students become aware of the strategy, one that they already use very commonly in their everyday lives;

2. Give students quick examples of what it means to make an inference;

3. Model good questioning techniques that call for inferences and help students to learn to frame such questions.

BECOMING AWARE

Explain that teachers can help students become conscious or aware of the strategy of making inferences by using an activity like the reading one above or by starting with simple sentences and seeing how many inferences can be made from it.

Sample Scenario:

If I said to Cheryl, "Go quietly to the room next door and bring back the blue cup with the broken handle," what inferences could one make from that sentence?

Possible Examples:

1. There is a need to be quiet, perhaps a class is going on or people are in the hall.

2. There are probably other rooms nearby since the location was specified.

3. There is more than one cup in the room. There is more than one blue cup.

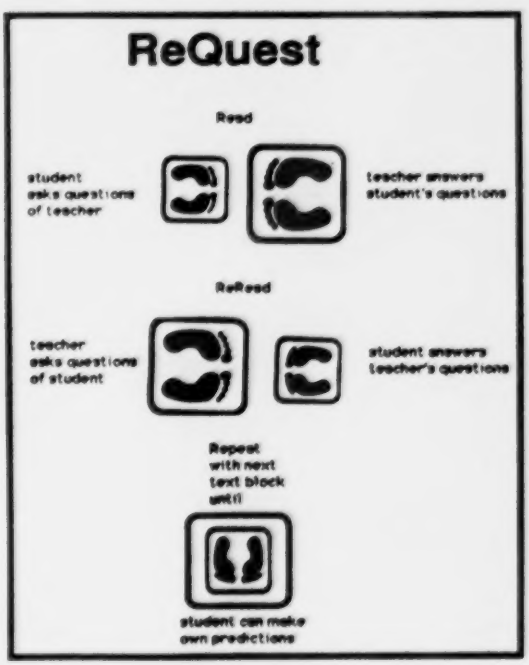
- Suggest that teachers should use other such examples to have the students practice the strategy. Students might also make up scenarios to try on each other. Explain that teachers should discuss the strategy with students and emphasize the point that it is a part of the reading process, that reading is much more than just remembering facts. Qualify the point by stating that it is important to be able to support inferences by reference to the text.

QUESTIONING TO ENCOURAGE INFERENCES

Mention that there are many new suggestions for instructional procedures that are designed to develop higher-order questioning strategies. Two of these procedures are referred to as **ReQuest** and **QARs.** With both of these approaches, two important teaching/learning approaches are incorporated:

1. the teacher <u>models</u> effective strategies, and

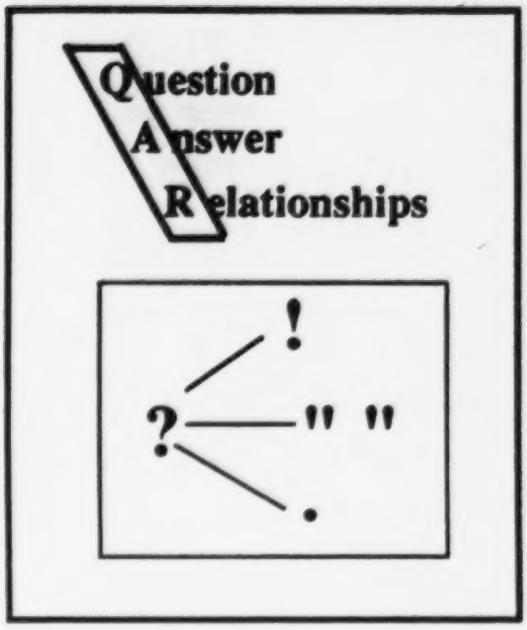
2. the student develops an <u>awareness</u> of effective questioning.



Display T-25 : "ReQuest"

Refer participants to page18 of the Handout. Explain that with **ReQuest**, the teacher and student read a selection together silently. At a pre-selected stopping point, each takes a turn asking questions of the other about the material read. The teacher can model and encourage questions that go beyond the literal level. When students develop greater expertise, they can pair up and do **ReQuest**.

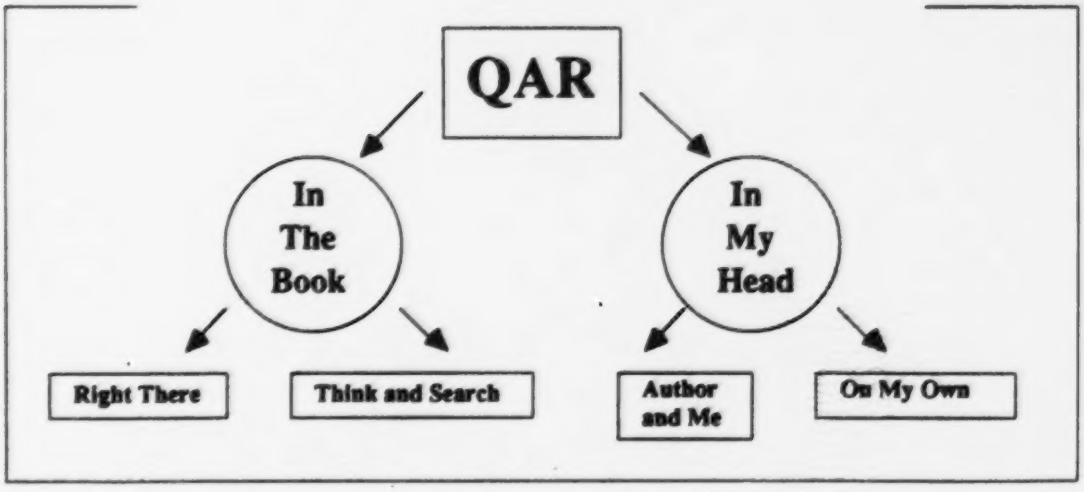
Display T- 26 : "QARs"



As a follow-up to the development of questioning behaviors, teachers may introduce students to the use of **Question-Answer Relationships**. This, too, will help them develop an awareness that the meaning they derive from written material is much more than just recall of facts, that it involves using their own background information and "constructing meaning."

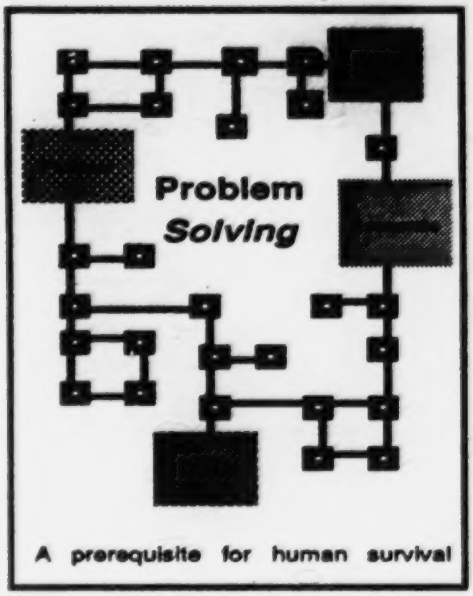
Refer participants to page19 of the Handout.

With QARs, students review questions to determine if they can be answered by finding the specific information as it is stated in the text ("In the Book") or by using some of their own knowledge ("In my Head"). Each of those categories is then divided further as follows:



- Explain that if students learn to evaluate and generate questions using this schema, they develop a much greater awareness of reading flexibly, with different purposes, and with greater depth and breadth.

- If time allows, practice ReQuest and QARs using the story, "Home", included in the Support Materials.



Display T- 27 : "Problem Solving"

Go over quote from Dimensions of Thinking:

> "The ability to solve problems is a prerequisite for human survival."

Observe that much instruction in problem solving is generally limited to well-structured problems. This imposes a severe constraint because many of the problems we face in real life, including important social, political, economic, and scientific problems, are "fuzzy" and "ill-structured".

Point out that the school focus on problem solving is often restricted to specific types of tasks presented in mathematics, science, and social studies.

> Most definitions of problem solving include a reference to goal-directed behavior, so determining the meaning of something being read is a problem to be solved, the result of a meaning-seeking process.

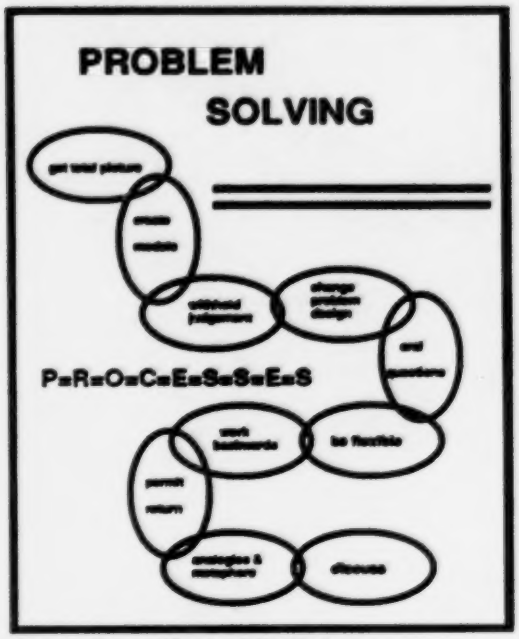
- Tell participants that Passage 6 (Symbols) in the Handout, p. 7 is a problem. Ask them to solve it. They may do so on their own, with someone else, or in a small group. (Do not give them any more direction than that given above. Part of the problem-solving task is to determine the problem implied.)

- After they have worked a few minutes, ask them to share the results of their work.

- At some point in the discussion, someone should interpret what the passage says. After a reasonable amount of time has been spent discussing strategies, you might talk about the problem of interpretation or "constructing meaning".

- Summarize by listing some of the processes involved in problem solving that were probably used in the preceding activity:

1. Get the total picture; don't get lost in detail.
2. Withhold judgment; don't commit yourself too early.
3. Create models to simplify the problem, using words, pictorial representations, symbols, or equations.
4. Try changing the representation of the problem.
5. State questions verbally, varying the form of the question.
6. Be flexible; question the flexibility of your premises.
7. Try working backwards.
8. Proceed in a way that permits you to return to your partial solutions.
9. Use analogies and metaphors.
10. Talk about the problem.

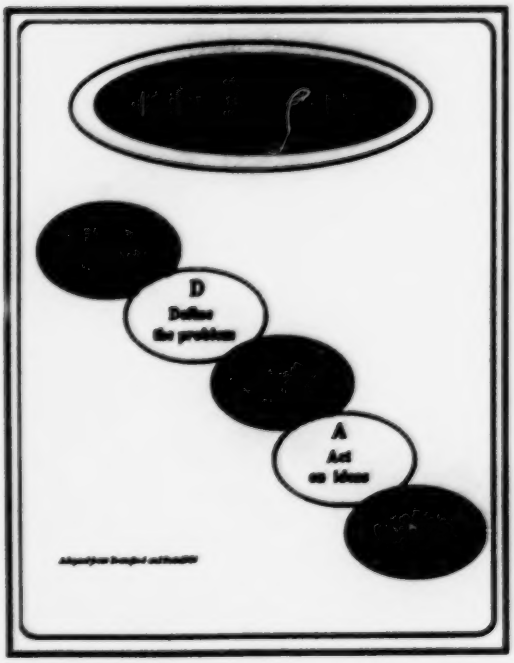


Display T- 28 : "Encourage Problem Solving"

Suggest that teachers encourage problem solving by creating situations in the classroom for which reading, writing, and using numbers (or other pieces of information) are the solution.

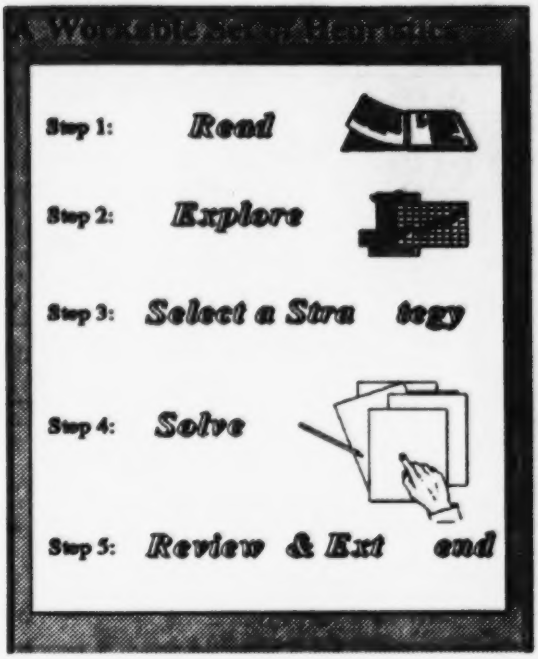
Instructional ideas for teaching problem solving are often based on a *set of heuristics* or suggestions and questions for approaching a problem.

(After presenting the following two ideas for teaching problem solving, suggest that participants refer to the list of problem-solving strategies and the two sets of heuristics to solve the problem presented on the next page of this guide.)



Display T- 29 : " I.D.E.A.L."

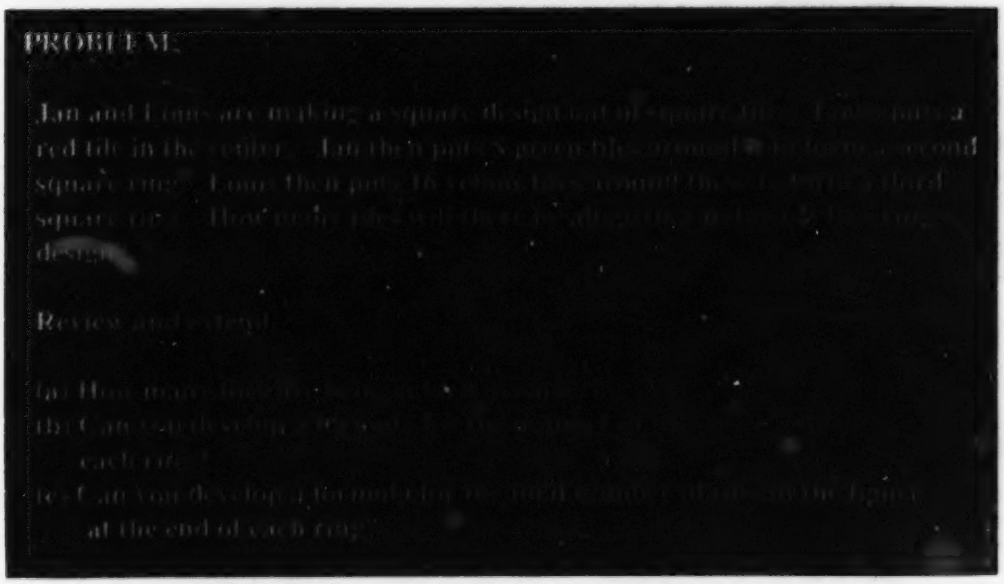
Suggest the model known by the acronymn, "I.D.E.A.L." (developed by Bransford and Stein) as one set of strategies to use to foster problem solving.



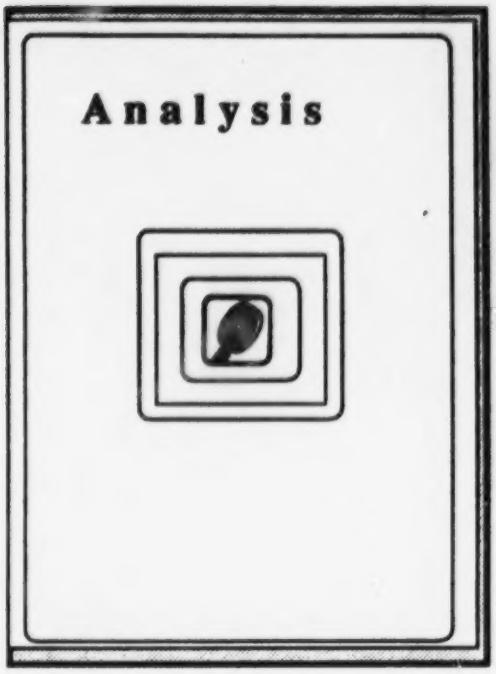
Display T-30 : "A Workable Set of Heuristics"

Present "A Workable Set of Heuristics" from Krulick and Rudnick (1987). Refer participants to pp. 21-24 in the Handout and review steps briefly.

Refer participants to problem presented on p. 20 of the Handout. Ask them to work on the solution either independently or with a partner/group. Tell them to use lists of strategies already presented.



Note: Alternative problems to use in replace of those used above or to extend workshop are available in Section 6, Support Materials.



Display T- 31 : "Analysis"

Analyzing skills are used to clarify existing information by examining parts and relationships--to "look inside" ideas.

Refer participants to poem, "Missing Lips", on page 8 of the Handout.

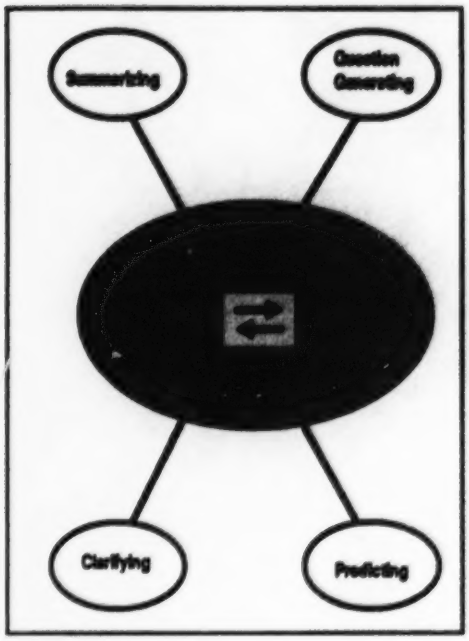
Activity
"Missing Lips"

Ask participants to read the poem and make a list of "Lips' Behaviors" and "I's Behaviors." Ask them to review lists with a partner/group and talk about what traits or beliefs are suggested by the behaviors.

Point out that this type of analysis is often reserved for a unit on poetry because poems so often demand it, but that similar analyses can be encouraged using any prose material or mathematical problem.

- Suggest that a number of teaching strategies have been developed and researched by educators that include instructional steps designed to provoke deeper thought.
- Emphasize that the examples you will share are only a very few of many that have been and are being developed.

Refer participants to pages 25-32 of the Handout on which they will find descriptions of three instructional approaches that encourage the analysis of reading material.



Display T- 32 : "Reciprocal Teaching"

Reciprocal Teaching is an instructional activity that takes place in the form of a dialogue between teachers and students regarding segments of text. The dialogue is structured by the use of four strategies: summarizing, question generating, clarifying, and predicting. The teacher and students take turns assuming the role of teacher in leading this dialogue.

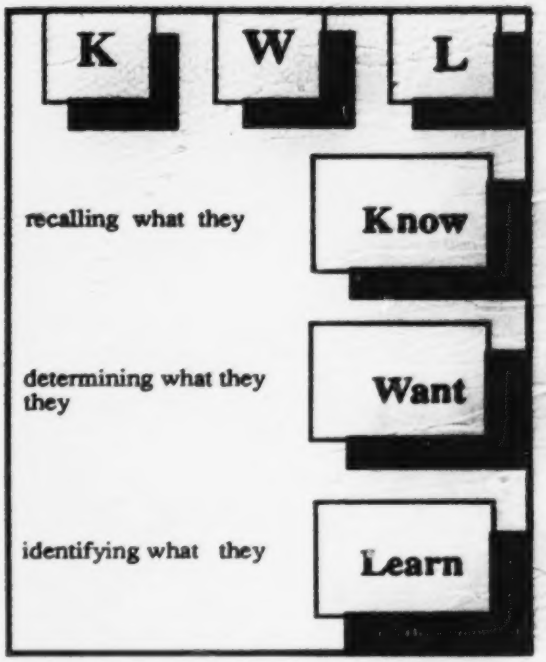
Procedures in Reciprocal Teaching:

Summarizing provides the opportunity to identify and integrate the most important information in the text.

Question generating reinforces the summarizing strategy. When students generate questions, they first identify the kind of information that is significant enough to provide the substance for a question. They then pose this information in question form and self-test to ascertain that they can indeed answer their own question.

Clarifying is an activity that requires students to explain anything that is difficult to understand or that is not making sense to them as they are reading.

Predicting occurs when students hypothesize what the author will discuss next in the text. To do this, students must activate the relevant background knowledge that they bring to the task. It gives them a purpose for reading: to confirm or disprove their hypotheses.



Display T-33 : "K.W.L."

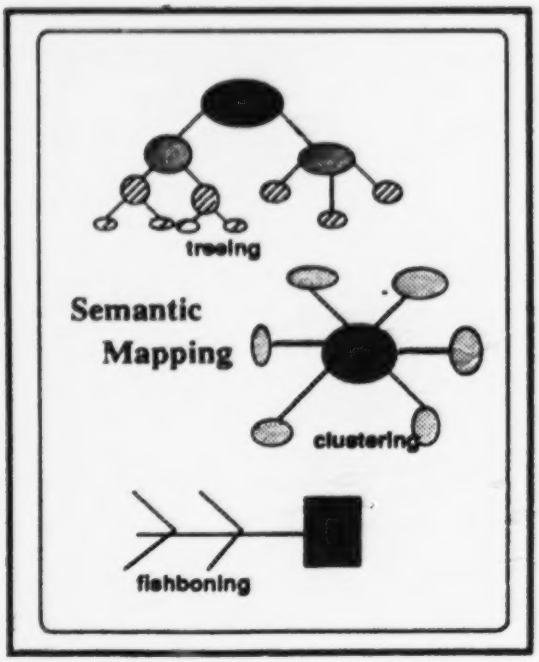
Explain that the meaning of the acronym is as follows:

"K" = Recalling what they KNOW;

"W" = Determining what students WANT to know or find out;

"L" = Identifying what they LEARN as they read;

The strategy is designed to help students develop a more active approach to reading expository material. Teachers first model and stimulate the kinds of thinking needed for learning and then give students individual opportunities to write out what they know, what questions they want answered, and what they have learned from reading the text.



Display T-34 : "Semantic Mapping"

Semantic maps are diagrams which help students see how words and ideas are related to each other. An early reference on semantic mapping was a 1971 Journal of Reading article by M.B. Hanf that was entitled: "Mapping: A technique for translating reading into thinking". It can be used before, during or after reading to help students analyze what they know prior to reading or to conceptualize the ideas they derive from their reading, to "get the big picture."

(If time permits, choose a mapping activity from the section on mapping in this guide to elaborate the idea.)

SUMMARY AND WRAP-UP

- Explain that in discussing the "why, what, and wherefore" of advanced skills, you have attempted to:

  1. Give a rationale for integrating advanced skills in Chapter 1 instruction based on the law and research emphasizing the importance and the feasibility of teaching thinking.

  2. Present a framework for thinking about thinking that is applicable to instruction.

  3. Suggest specific ways that Chapter 1 teachers can teach "higher order" strategies and by so doing, reinforce "basic" skills.

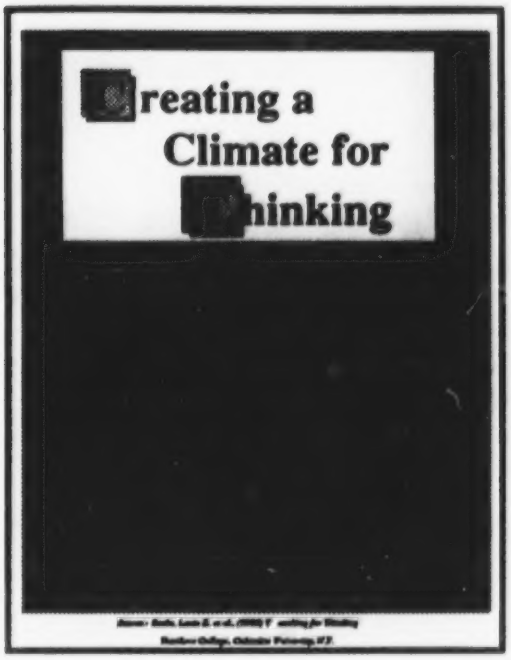
- To summarize, emphasize the following points:

  1. Teachers should be strongly cautioned against lock-step applications of skill hierarchies. Higher-level thinking skills such as verifying and summarizing are based on recalling and comparing information and are not somehow "above" these skills.

  2. Current research on cognitive development suggests that low-achieving students can be taught complex skills successfully--given instruction in cognitive and metacognitive strategies and adequate teacher support in modeling, coaching, and guided practice.

> One way of conceptualizing the sequencing of thinking skills instruction is to use the "ski analogy" developed by Burton, Brown, and Fischer (1984). One ultimately wants to learn to ski with long skis, but learning to ski with long skis is cumbersome and inefficient. Teaching prerequisite skills needed for long skis (such as holding the poles, breathing, and turning) separately from the process of skiing in specific environments is not helpful. Learning to ski with short skis, using rudiments of the various skills needed for long skis, is more productive. Then as the novice gains proficiency, the skis become longer, and the learning environments change to provide more challenging contexts.

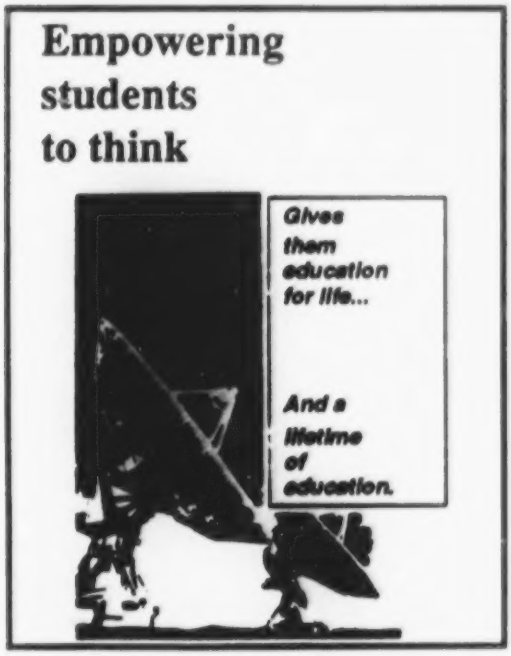
  3. The above analogy applies to sequencing thinking skills both in adjunct courses and content courses. Instead of teaching dozens of discrete subskills in a progression from easy to difficult, schools might define a limited number of core skills and focus on teaching these skills in ever more challenging learning contexts (or maybe we could say "tight spots" from which students can use their reasoning skills to emerge as confident learners and problem solvers.)



Display T-35 : "Creating a Climate"

Emphasize the importance of creating a climate in the classroom in which thinking is encouraged, supported, and integrated in the curriculum.

Point out that Chapter 1 students need repeated reminders that they are capable of higher order thinking. Teachers should use terminology that supports the use of thinking skills, e.g., predicting, analyzing, thinking about thinking, strategies, inquiry, etc.



Display T-36 : "Empowering Students to Think"

Successful teaching is whatever helps students think appropriately. In the preface to a recent book on strategic teaching and learning (Jones, et al., 1986), it is noted that the "new vision of teaching" is "one of a strategic process" in which the teacher teaches not only content, but strategies required by that content to make learning meaningful, integrated, and transferable. The concept of strategic teaching suggests using certain instructional strategies that are known or believed to be effective in promoting understanding and the teaching of strategies that students will find useful in learning and thinking.

"None of this is easy. Our own history is our enemy."

Display T-37 : "None of this is Easy"

Repeat beginning of quote presented at beginning of the workshop.

Emphasize the need for improving instruction in all classrooms.

Display T-38 : "But times change..."

Review second half of quote. Discuss the need for all educators to accept the challenge of educating all children to their fullest potential.

"But times change. This could be the year that 'thinking goes to school'."

And Remember...

Display T- 39 : "Remember.."

Participants should leave the workshop with an understanding that the teaching of thinking should be a teacher's first priority. They should feel that they have learned some strategies for accomplishing this goal.

PEOPLE SEARCH

FIND SOMEONE WHO:

Can name the six levels of Bloom's Taxonomy.	**Can explain metacognition.**
Shares your views about Dan Quayle.	**Ranks these items the same as you do:** ☐ mind ☐ body ☐ soul
Can name the ten longest rivers in the United States. **Can you find someone who really cares?**	**Memorized all of the state capitals as a student.** **Can they still name them? (However, there isn't time for proof!)**

PASSAGE 1

The Discus Thrower

Richard Selzer (b.1928) is a surgeon and professor of surgery at the Yale University Medical School, as well as an award-winning author. In the essay reprinted here, which first appeared in Harper's magazine in 1977, Selzer reports on the visits he made to one of his patients.

I spy on my patients. Ought not a doctor to observe his patients by any means and from any stance, that he might the more fully assemble evidence? So I stand in the doorways of hospital rooms and gaze. Oh, it is not all that furtive an act. Those in bed need only look up to discover me. But they never do.

From the doorway of Room 542, the man in the bed seems deeply tanned. Blue eyes and close-cropped white hair give him the appearance of vigor and good health. But I know that his skin is not brown from the sun. It is rusted, rather, in the last stage of containing the vile repose within. And the blue eyes are frosted, looking inward like the windows of a snowbound cottage. This man is blind. This man is also legless--the right leg missing from the midthigh down, the left from just below the knee. It gives him the look of a bonsai, roots and branches pruned into the dwarfed fascimile of a great tree.

Propped on pillows, he cups his right thigh in both hands. Now and then he shakes his head as though acknowledging the intensity of his suffering. In all of this, he makes no sound. Is he mute, as well as blind?

The room in which he dwells is empty of all possessions -- no get-well cards, small, private caches of food, day-old flowers, slippers, all the usual kickshaws of the sickroom. There is only the bed, a chair, a nightstand, and a tray on wheels that can be swung across his lap for meals.

"What time is it?" he asks.
"Three o'clock."
"Morning or afternoon?"
"Afternoon."

He is silent. There is nothing else he wants to know.

"How are you?" I say.
"Who is it?" he asks.
"It's the doctor. How do you feel?"

He does not answer right away.

"Feel?" he says.
"I hope you feel better." I say.

I press the button at the side of the bed.

"Down you go." I say.
"Yes, down." he says.

He falls back upon the bed awkwardly. His stumps, unweighted by legs and feet, rise in the air, presenting themselves. I unwrap the bandages from the stumps, and begin to cut away the black scabs and the dead glazed fat with scissor and forceps. A shard of white bone comes loose. I pick it away. I wash the wounds with disinfectant and redress the stumps. All this while, he does not speak. What is he thinking behind those lids that do not blink? Is he remembering a time when he was whole? Does he dream of feet? Of when his body was not a rotting log?

He lies solid and inert. In spite of every thing, he remains impressive, as though he were sailor standing athwart a slanting deck.

"Anything more I can do for you?" I asked.

For a long moment he is silent.

"Yes," he says at last and without the least irony. "You can bring me a pair of shoes."
In the corridor, the head nurse is waiting for me.

"We have to do something about him," she says. "Every morning he orders scrambled eggs for breakfast, and, instead of eating them, he picks up the plate and throws it against the wall."

"Throws his plate?"

"Nasty. That's what he is. No wonder his family doesn't come to visit. They probably can't stand him any more than we can."

She is waiting for me to do something.

"Well?"

"We'll see." I say.

The next morning I am waiting in the corridor when the kitchen delivers his breakfast. I watch the aide place the tray on the stand and swing it across his lap. She presses the button to raise the head of the bed. Then she leaves.

In time the man reaches to find the rim of the tray, then on to find the dome of the covered dish. He lifts off the cover and places it on the stand. He fingers across the plate until he probes the eggs. He lifts the plate in both hands, sets it on the palm of his right hand, balances it. He hefts it up and down slightly, getting the feel of it. Abruptly, he draws back his right arm as far as he can.

There is the crack of the plate breaking against the wall at the foot of his bed and the small wet sound of the scrambled eggs dropping to the floor.

And then he laughs. It is a sound you have never heard. It is something new under the sun. It could cure cancer.

Out in the corridor, the eyes of the head nurse narrow.

"Laughed, did he?"
She writes something down on her clipboard. A second aide arrives, brings a second breakfast tray, puts it on the nightstand, out of his reach She looks over at me shaking her head and making her mouth go. I see that we are to be accomplices.

"I've got to feed you," she says to the man.
"Oh, no you don't," the man says.
"Oh, yes I do," the aide says "after the way you just did. Nurse says so."

"Get me my shoes," the man says.
"Here's oatmeal," the aide says. "Open."

And she touches the spoon to his lower lip.

"I ordered scrambled eggs," says the man.
"That's right," the aide says.

I step forward.

"Is there anything I can do?" I say.
"Who are you?" the man asks.

In the evening I go once more to the ward to make my rounds. The head nurse reports to me

that Room 542 is deceased. She has discovered this quite by accident, she says. No, there had been no sound. Nothing. It's a blessing, she says.

I go into his room, a spy looking for secrets. He is still in his bed. His face is relaxed, grave, dignified. After a while, I turn to leave. My gaze sweeps the wall at the foot of the bed, and I see the place where it has been repeatedly washed, where the wall looks very clean and white.

PASSAGE 2

With one end of the vehicle in such a position, the wooden implement was totally useless. A different tool might remedy the situation somewhat, but, unfortunately, one was not close at hand. The lack of balance made forward progress impossible. Changing positions would not help due to the nature of the vehicle, and jumping up and down could to other problems. In order to make better use of the implement, the man would have to alter his position quite a bit, and he would either topple over, or the whole thing would be reversed. Gazing downward at his bulky companion who seemed disinterested in his plight, the man decided the only remedy was to bring some other assistant the next time. The right kind of person would certainly eliminate the problem.

PASSAGE 3

If the balloons popped, the sound wouldn't be able to carry since everything would be too far away from the correct floor. A closed window would also prevent the sound from carrying, since most buildings tend to be well insulated. Since the whole operation depends on a steady flow of electricity, a break in the middle of the wire would also cause problems. Of course, the fellow could shout, but the human voice is not loud enough to carry that far. An additional problem is that a string could break on the instrument. Then there could be no accompaniment to the message. It is clear that the best situation would involve less distance. Then there would be fewer potential problems. With face to face contact, the fewest number of things could go wrong.

PASSAGE 4

Louis slowly got up from the mat, planning his escape. He hesitated a moment and thought. Things were not going well. What bothered him most was being held, especially since the charge against him had been weak. He considered his present situation. The lock that held him was strong but he thought he could break it. He knew, however, that his timing would have to be perfect. Louis was aware that it was because of his early roughness that he had been penalized so severely-much too severely from his point of view. The situation was becoming frustrating; the pressure had been grinding on him for too long. He was being ridden unmercifully. Louis was getting angry now. He felt he was ready to make his move. He knew that his success or failure would depend on what he did in the next few seconds.

PASSAGE 5

Every Saturday night, four good friends get together. When Jerry, Mike, and Pat arrived, Karen was sitting in her living room writing some notes. She quickly gathered the cards and stood up to greet her friends at the door. They followed her into the living room but as usual they couldn't agree on exactly what to play. Jerry eventually took a stand and set things up. Finally, they began to play. Karen's recorder filled the room with soft and pleasant music. Early in the evening, Mike noticed Pat's hand and the many diamonds. As the night progressed, the tempo of play increased. Finally, a lull in the activities occurred. Taking advantage of this, Jerry pondered the arrangement in front of him. Mike interrupted Jerry's reveries and said, "Let's hear the score." They listened carefully and commented on their performance. When the comments were all heard, exhausted but happy, Karen's friends went home.

Τηε γρεατεστ γοοδ ωε χαν δο φορ

οτηερσ ισ νοτ φυστ το σηαρε

ουρ ριχηεσ ωιτη τηεμ

≈ βυτ ≈

το ρεϖεαλ τηειρ ριχηεσ το

τηεμσελϖεσ.

PASSAGE 7

Missing Lips

My lips threaten to run away
To disappear without a trace
To fall down my mouth forever.

Wait, I cry. Don't leave me.
I stab at them with my lipstick,
Try to make them understand.

Leave us alone, they answer.
We want to go away
To a warmer climate for the winter.

Go then, I scream.
See how you do without me.
See if you find someone to feed you.

They fly south on my credit cards,
Charge hotels and meals in Fort Lauderdale,
Swim suits and lounge robes in Palm Springs.

In March they return,
Juicy and brassy,
Talking too much,
Even to strangers in elevators
Who look at the floor indicators and
Try not to notice.

They kiss far too often that summer,
Multitudes of mouths on tennis courts and in
cloakrooms.
But none seem to move them
Out of their terrible insolence.

I try to ignore them.
They are getting out of hand.
I feed them nothing but lip gloss for months.

They take off on a Greyhound bus,
Work as waitresses, mouth off to truckdrivers
Who complain about weeping meringues on lemon pies.

PASSAGE 6

And the Rock Cried Out

Ray Bradbury

The raw carcasses, hung in the sunlight, rushed at them, vibrated with heat and red color in the green jungle air, and were gone. The stench of rotting flesh gushed through the car windows, and Leonora Webb quickly pressed the button that whispered her door window up.

"Good Lord," she said, "those open-air butcher shops."

The smell was still in the car, a smell of war and horror.

"Did you see the flies?" she asked.

"When you buy any kind of meat in those markets," John Webb said, "you slap the beef with your hand. The flies lift from the meat so you can get a look at it."

He turned the car around a lush bend in the green rain-jungle road.

"Do you think they'll let us into Juatala when we get there?" "I don't know."

"Watch out!"

He saw the bright things in the road too late, tried to swerve, but hit them. There was a terrible sighing from the right front tire, the car heaved about and sank to a stop. He opened his side of the car and stepped out. The jungle was hot and silent and the highway empty, very empty and quiet at noon.

He walked to the front of the car and bent, all the while checking his revolver in its underarm holster.

Leonora's window gleamed down. "Is the tire hurt much?"

"Ruined, utterly ruined!" He picked up the bright thing that had stabbed and slashed the tire. "Pieces of a broken machete," he said, "placed in adobe holders pointing toward our car wheels. We're lucky it didn't get all our tires."

"But why?"

"You know as well as I." He nodded to the newspaper beside her, at the date, the headlines:

October 4th, 1983: United States,
Europe Silent!
The radios of the U.S.A. and Europe are dead. There is
a great silence. The War has spent itself.

It is believed that most of the population of the United States is dead. It is believed that most of Europe, Russia, and Siberia is equally decimated. The day of the white people of the earth is over and finished.

Strategies for Teaching Advanced Skills

Advanced skills as stated in the Chapter 1 law

Section 1471 of the Augustus F. Hawkins-Robert T. Stafford Elementary and Secondary School Improvement Amendments of 1988:

"The term 'more advanced skills' means skills including reasoning, analysis, interpretation, problem-solving, and decision-making as they relate to the particular subjects in which instruction is provided under programs supported by this chapter."

"It seems then the need is to both teach thinking in the abstract to ensure that students are aware of specific aspects of thinking and also teach traditional courses in such a way as to illustrate the applicability of good thinking in those contexts and to provide daily opportunities to exercise it."

Ray Nickerson

DIMENSIONS OF THINKING FRAMEWORK

I. Metacognition

A. Knowledge and Control of Self

1. Commitment
2. Attitudes
3. Attention

B. Knowledge and Control of Process

1. Types of knowledge important in metacognition

a. Declarative knowledge
b. Procedural knowledge
c. Conditional knowledge

2. Executive control of behavior

a. Evaluation
b. Planning
c. Regulation

II. Critical and Creative Thinking

A. Critical Thinking

1. Dispositions

2. Abilities

a. Elementary Clarification
   1. Focusing on a question
   2. Analyzing arguments
   3. Asking and answering questions of clarification and challenge

b. Basic Support
   1. Judging the credibility of a source
   2. Observing and judging observation reports

c. Inference
   1. Deducing and judging deductions
   2. Inducing and judging inductions
   3. Making and judging value judgments

d. Advanced clarification
   1. Defining terms and judging definitions
   2. Identifying assumptions

e. Strategy and tactics
   1. Deciding on an action
   2. Interacting with others

B. Creative Thinking

1. Basic Premises

a. Creativity takes place in conjunction with intense desire and preparation.

b. Creativity involves working on the edge rather than the center of one's capacity.

c. Creativity requires an internal rather than external locus of evaluation.

d. Creativity involves reframing ideas.

e. Creativity can sometimes be facilitated by getting away from intensive engagement for awhile to permit free-flowing thought.

III. Thinking Processes

A. Concept Formation

1. Levels of concept formation

a. concrete
b. identity
c. classificatory
d. formal

2. Principle formation

a. Kinds of principles

1. cause-and-effect
2. correlational
3. probability
4. axiomatic

a. fundamentals
b. laws
c. rules

B. Comprehension

C. Problem Solving

1. Processes-lists of unordered strategies

a. Get the total picture
b. Withhold judgment
c. Create models
d. Try changing the representation
e. State questions verbally
f. Be flexible
g. Try working backwards
h. Proceed in a way that allows you to return to partial solutions
i. Use analogies and metaphors
j. Talk about the problem

D. Decision Making

1. Model for decision making
   a. State the goal
   b. Generate ideas
   c. Prepare a plan
   d. Take action

E. Research (Inquiry)

1. Describing phenomena
2. Formulating hypotheses
3. Testing hypotheses

F. Composition

1. Planning
2. Translating
3. Reviewing

IV. Core Thinking Skills

A. Focusing Skills

1. Defining problems
2. Setting goals

B. Information Gathering Skills

1. Observing
2. Formulating questions

C. Remembering Skills

1. Encoding
2. Recalling

D. Organizing Skills

1. Comparing
2. Classifying
3. Ordering
4. Representing

E. Analyzing Skills

1. Identifying attributes and components
2. Identifying relationships and patterns
3. Identifying main ideas
4. Identifying errors

F. Generating Skills

1. Inferring
2. Predicting
3. Elaborating

G. Integrating Skills

1. Summarizing
2. Restructuring

H. Evaluating Skills

1. Establishing Criteria
2. Verifying

V. Relationship of Content-Area Knowledge to Thinking

A. Content-area learning as schema-dependent

B. Content areas as models and metaphors

C. Content areas as changing bodies of knowledge

D. Content areas as special approaches to investigation

HOW TO GET STARTED WITH THE THINK-ALONG PROCESS: GETTING STUDENTS TO BE ACTIVE CONSTRUCTORS OF MEANING

Roger Farr
Indiana University

WHAT IS A THINK ALONG?

A THINK ALONG *is a teaching strategy that makes the invisible thinking process of reading visible. It is an attempt on the part of the teacher to model the thinking process that any good reader engages in when reading.*

---

1. The teacher reads to the students while the students follow along with their own copy of the story.
2. It is best not to prepare a story ahead of time. Read as you do the first time. Of course, you will have to exaggerate some of the strategies.
3. Enjoy the story!
4. Use strategies, but don't identify them.
5. Just think aloud so the students will be able to think along.

USING A THINK ALONG

- Ask the students what kind of things you did as you were reading. Make a list on the chalkboard.
- Use the list on the chalkboard to make a printed list the students can use the next time to check the things you were doing.
- Discuss the things that were checked by the students. Ask if you did some things more than once.
- Ask the students if they do those things when they read. Talk about whether the Think-along strategies make the story more interesting.
- Ask students if they'd like to read to the class and use the strategies that you used. Call on volunteers.
- Ask the students to listen for strategies. Talk about the strategies that were used.
- Have students try out reading strategies with each other as they read in small groups.
- Have students tape record their reading aloud as they use the Think-along strategies.
- Ask students to listen to their tape recordings to see how many strategies they are using.

Assessment of Reading Strategies

You need to talk to a student about his reading. Questions may be asked before, during, and after the student read. You might ask the student to tell you...

- o what a scene or character looks like.
- o what happens next--even after a story is finished.
- o if he changed his mind about story events or characters as he read.
- o if the story reminds him of anything that happened to him--or that he knows about.

Factors that Result in Poor Reading Comprehension

Poor comprehenders often seem not to:

--develop a clear focus or purpose for reading--especially before they start reading;

--form a good hypothesis about the text's meaning before they read;

--make mental images about what they are reading;

--monitor their comprehension (fix-up and change) to see that everything makes sense;

--use their prior knowledge of similar information;

--summarize as they read;

--relate their reading to the immediate situation;

--relate their reading to previous experiences.

Strategies in Thinking Along

1. Guessing the meaning of words.
2. Using things you already know about.
3. Making predictions.
4. Changing predictions.
5. Using background to make sense.
6. Taking the part of a character.
7. Thinking about your opinions and reactions.
8. Getting your emotions involved.
9. Summarizing.
10. Making mental pictures.
11. Not deciding right away.
12. Re-reading.

And here's the most important point about Think-along strategies. You can't use Think-along strategies unless you are comprehending the story.

THINK ABOUT IT!

Reading

ROGER FARR

Teaching Good Habits with Think-Alongs

In 1983 Beth Davey suggested an instructional process that she called *think-aloud* in which the teacher models the thinking strategies good readers use to construct meaning. Now often called *think-along*, the process has been adopted in a number of schools. In its recent reading textbook adoption, for example, the State of Virginia asked the reviewers to look for the process in the basals they were considering.

During the think-along process, the teacher reads a story, or an excerpt, aloud to students, who follow along in their copies. As the teacher reads, she *thinks-aloud* so the students can *think-along* with her, for instance, by:

- repeating or elaborating on details of how a scene or character looked,
- predicting what might happen next,
- admitting confusion over the meaning of a work or phrase,
- rereading portions to clarify meaning,
- verbalizing background knowledge that is being activated to help clarify meaning.

In brief, the teacher reads aloud and verbalizes the kind of things any good reader thinks about while trying to comprehend new material.

The Lettie Marshall Dent Elementary School in Mechanicsville, Maryland, has used the think-along approach for several years.[1] Teachers there, however, have expanded the process so that after students experience think-alongs with the teacher, they pair up and use think-alongs with each other, coaching each other after oral reading. Students also use checklists to record quickly and easily the think-along strategies demonstrated by the teacher and special bookmarks to remind them of strategies to use during silent reading.

Teachers at the school have collected data about the think-along method that indicate students' behaviors have changed in several important ways:

1. The students' view of the reader's role has shifted from that of passive receiver of knowledge to one of active participant in constructing knowledge.
2. As students discuss and expand on the texts they are reading—without the use of teacher or text questions—their verbal skills have increased, and they participate verbally in other classroom discussions with greater frequency and fluency.
3. As they monitor their comprehension through the think-along process, students are becoming more independent as readers.

As the teacher reads, she *thinks-aloud* so the students can *think-along* with her.

The Lettie Marshall Dent School has also collected pilot test score data to determine the effectiveness of the process. The results suggest that students who are taught the think-along process score higher on standardized reading tests than comparable students who are not taught to "think along." Teachers in this school and in others across the country are also applying the think-along process to math, science, and social studies.

Certainly think-along is not a new teaching strategy. Good teachers have always employed comparable techniques. Think-along does, however, bring together some important current thinking about teaching as modeling, the use of metacognition, the emphasis on reading strategies rather than skills, and the application of previous knowledge to construct new meaning.□

[1]For more information, contact Patricia Russavage, Principal, Lettie Marshall Dent Elementary School, Mechanicsville, MD 20659.

Reference

Davey, B. (October 1983). "Think-Aloud—Modeling the Cognitive Process of Reading Comprehension." *Journal of Reading*, 44–47.

Roger Farr is Director, Center for Reading and Language Studies, and Associate Director, ERIC Clearinghouse on Reading and Communication Skills (whose resources were used to locate background information for this article), Smith Research Center, Indiana University, School of Education, Bloomington, IN 47408.

REQUEST
Reciprocal Questioning

Background Information

The ReQuest Procedure was developed by Anthony Manzo (1969) to guide students through as many sentences as necessary to enable the student to comprehend the rest of the passage successfully. The ReQuest Procedure is designed to improve the student's reading comprehension by providing an active learning situation for the development of questioning behaviors. The teacher encourages the student to ask questions about the text material and to set his/her own purposes for reading. The ReQuest Procedure was originally devised as a remedial procedure involving an individual student and the teacher, but it can also be utilized with pairs, teams, and/or small groups.

The procedure is indirectly diagnostic; by noting the kinds of questions the student asks for each kind of text structure, the teacher can determine whether the student is comprehending. Through teacher modeling of good questioning behavior, the student gains insight into how good readers ask themselves questions as they are reading. In addition, the procedure encourages the exchange of content information and the exchange of ideas.

Initiation

The ReQuest Procedure consists of the following steps:

1. Both the student and the teacher silently read a common selection from the text. The selection can be read one sentence at a time or a paragraph at a time.

2. After they have both read the passage, the student asks as many questions as possible. The teacher answers the questions clearly and completely.

3. Then it is the teacher's turn to ask the questions about the same sentence or paragraph, and the student answers as fully as possible. By forming questions which call upon the student's grasp of text structures, the teacher models good questioning strategies.

4. When the student has finished answering, teacher and student read the next sentence or paragraph and proceed as before.

5. When the student has processed enough information to make predictions about the rest of the selection, the exchange of questions stops. The teacher then asks directed reading type questions: "What do you think the rest of the assignment is about?" "Why do you think so?" The student reads the rest of the assignment.

6. The teacher facilitates follow-up discussion of the material.

Interaction

The teacher chooses a story or passage to be read by the student and the teacher; content area texts and prose materials work equally well. Both the student and the teacher need copies of the reading materials. This procedure can be done with an individual student and the teacher or with pairs, teams, and/or small groups. Students are told they will read a story and take turns asking each other questions over a specified section to improve their understanding of what they read.

Application

Students practice this technique on both short and long reading passages to develop self-monitoring skills. Students should be encouraged to ask questions that will stimulate interpretive or applied levels of thinking such as questions on the main idea of the passage.

Expansion

As a follow-up on the development of questioning behaviors, the students are introduced to the Question-Answer Relationship (QAR). The QAR strategy helps students clarify the different sources of information available to answer questions during the ReQuest Procedure.

The teacher helps the student decide if the questions they asked can be answered from information IN-THE-BOOK or IN-MY-HEAD. The IN-THE-BOOK category can be expanded to include:

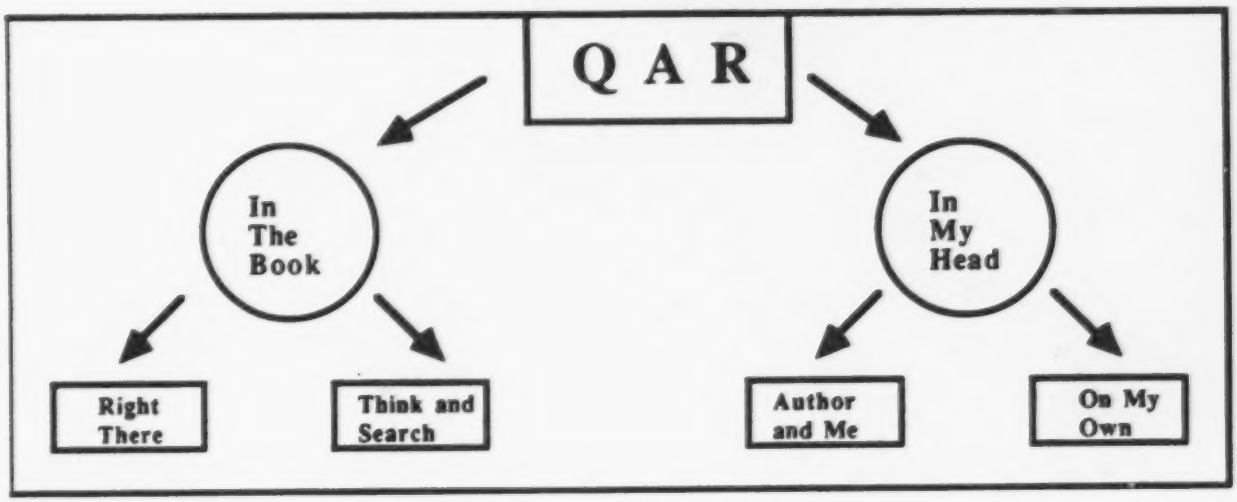
1. answers that are stated in the text (RIGHT THERE).

2. answers that require the reader to put together material from the text (THINK AND SEARCH).

The IN-MY-HEAD category can include answers that require:

1. students to think about what they already know and how that information fits in with the information the author provides in the text (AUTHOR AND ME).

2. questions that can be answered without reading the text (ON MY OWN).



References:

Brown, A. L., Palincsar, A. S., and Armbruster, B. B. "Instructing comprehension-fostering activities in interactive learning situations," in H. Mandl, N. L. Stein, and T. Trabasso (Eds.), Learning and Comprehension of Text (pp. 255-286). Hillsdale, NJ: Erlbaum, 1984.

Manzo, Anthony. "Request procedure," Journal of Reading, 123-126, V. 13, 1969.

Palincsar, A. S. "The quest for meaning from expository text: A teacher-guided journey," in G. Duffy, L. Roehler, and J. Mason (Eds.), Comprehension Instruction: Perspectives and Suggestions (pp. 251-264). New York: Longman, 1984.

Raphael, T. E. "Question-answering strategies for children," The Reading Teacher, V. 36, 1982.

Raphael, T. E. QARS Revisited. Newark, DE: International Reading Association, 1985.

Problem Solving Strategies:

1. Get the total picture; don't get lost in detail.
2. Withhold judgment; don't commit yourself too early.
3. Create models to simplify the problem, using words, pictorial representations, symbols, or equations.
4. Try changing the representation of the problem.
5. State questions verbally, varying the form of the question.
6. Be flexible; question the flexibility of your premises.
7. Try working backwards.
8. Proceed in a way that permits you to return to your partial solutions.
9. Use analogies and metaphors.
10. Talk about the problem.

Source: *Dimensions of Thinking (ASCD)*

Cooperative Group Activity

Here is a map of the United States with 11 cities marked with dots. An airline has routes between some of the cities as shown by the route lines on the map.

The airlines employed 11 new people to sit in the central towers of 11 cities. The people are Alex, Linda, Nancy, Debbie, Elvis, Frances, Sheila, Bill, Lisa, Lou, and Ron. The two people in the cities with connecting routes will be talking to each other a great deal, so it would be helpful if they were friends already. Here are the pairs of people who are friends:

Alex - Linda	Bill - Frances	Lisa - Ron	Lou - Lisa
Sheila - Lou	Sheila - Lisa	Debbie - Elvis	Lou - Nancy
Debbie - Lisa	Alex - Sheila	Ron - Elvis	Debbie - Ron
Nancy - Bill	Alex - Debbie		

The cooperative group tasks:

1. **Place the eleven people in the eleven cities so that the people in connecting cities are friends.**

2. **Are there other ways to assign the people to the cities and still have friends in adjacent cities.**

3. **What cities do you think are designated by the dots on the map?**

Source: Adapted from a presentation by Jesse Rudnick, Temple University

A WORKABLE SET OF HEURISTICS
...to use in teaching problem solving

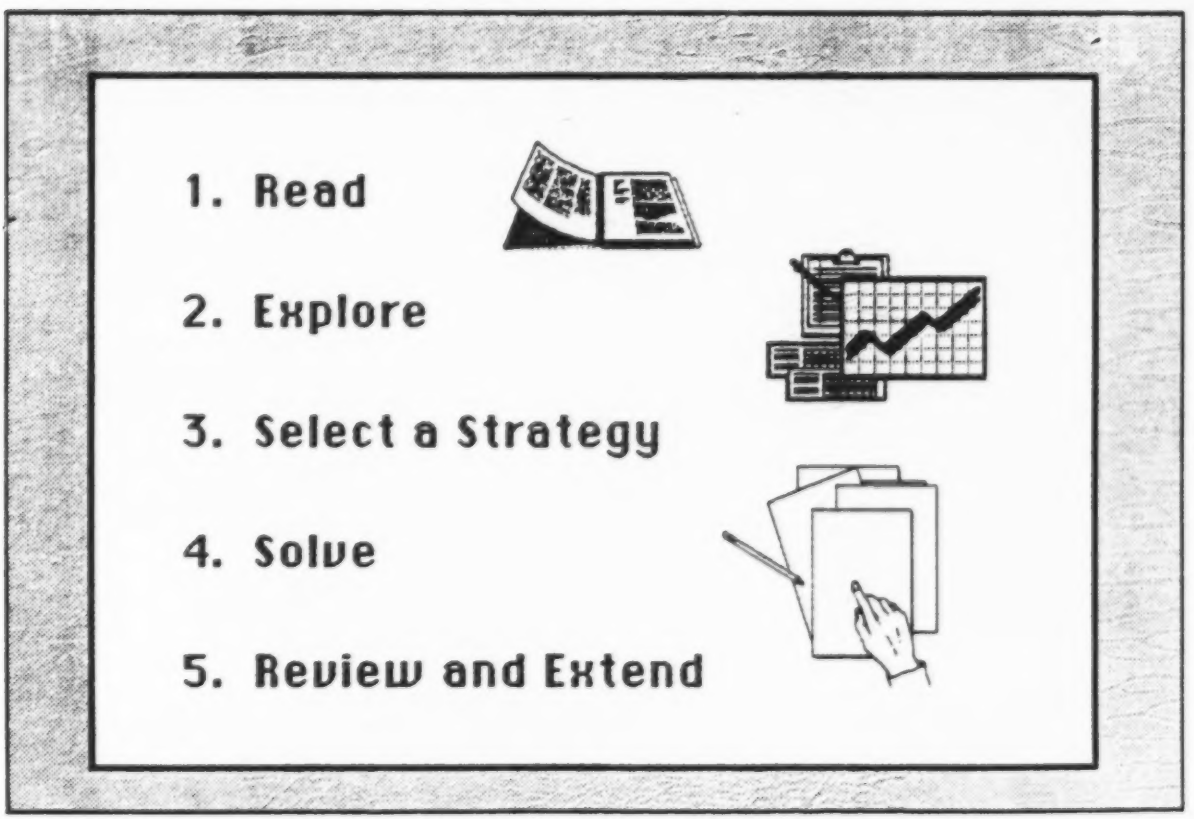
developed by Stephen Krulik & Jesse Rudnick

What are heuristics?

Problem solving is a *process*! A process that starts when the initial encounter with the problem is made and ends when the obtained answer is reviewed in light of the given information. Children must learn this *process* is they are to deal successfully with the problems they will meet in school and elsewhere. This process is complex and difficult to learn. It consists of a series of tasks and thought processes that are loosely linked together to form what is called a *set of heuristics* or a *heuristic pattern.* They are a set of suggestions and questions that a person must follow and ask themselves in order to resolve a dilemma.

There is no single set of heuristics for problem solving. Over the years, several sets of heuristics have been developed to assist students in problem solving. In the main, they are quite similar. Which set a student follows does not really matter. What <u>does</u> matter is that students learn some set of carefully developed heuristics, and that they develop the habit of applying these heuristics in all problem-solving situations.

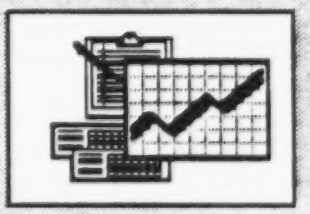
Krulik and Rudnick (1987) suggest a "workable set of heuristics" that has proven to be successful with students and teachers at all levels of instruction.



Read

1. Note the key words.
2. Describe the problem setting and visualize the action.
3. Restate the problem in your own words.
4. What is being asked for?
5. What information is given?

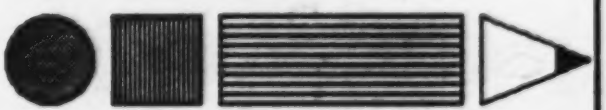
Explore



1. Organize the information.
2. Is there enough information?
3. Is there too much information?
4. Draw a diagram or construct a model.
5. Make a chart or a table.

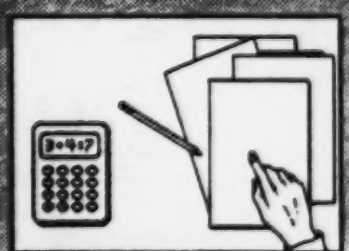
Select a Strategy

1. Pattern recognition
2. Working backwards
3. Guess and test
4. Simulation or experimentation
5. Reduction/solve a simpler problem
6. Organized listing/exhaustive listing
7. Logical deduction
8. Divide and conquer



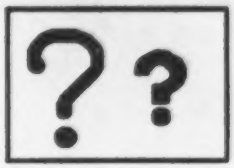
Solve

1. Carry through your strategy
2. Use computational skills
3. Use geometric skills
4. Use algebraic skills
5. Use elementary logic



Review and Extend

1. Verify your answer.
2. Look for interesting variations on the original problem.
3. Ask "What if...?" questions.
4. Discuss the solution.



Source: *Krulik, S. & Rudnick, J.A. Problem Solving: A Handbook for Teachers. Allyn & Bacon, Inc., 1987.*

RECIPROCAL TEACHING

developed by Annemarie Palincsar & Ann Brown

Definition

Reciprocal teaching is an instructional activity that takes place in the form of a dialogue between teachers and students regarding segments of text. The dialogue is structured by the use of four strategies: *summarizing, question generating, clarifying,* and *predicting*. The teacher and students take turns assuming the role of teacher in leading this dialogue.

Strategies

Summarizing provides the opportunity to identify and integrate the most important information in the text. Text can be summarized across sentences, across paragraphs, and across the passage as a whole. When students first begin the reciprocal teaching procedure, their efforts are generally focused at the sentence and paragraph levels. As they become more proficient, they are able to integrate at the paragraph and passage levels.

Question generating reinforces the summarizing strategy and carries the learner one more step along in the comprehension activity. When students generate questions, they first identify the kind of information that is significant enough to provide the substance for a question. They then pose this information in question form and self-test to ascertain that they can indeed answer their own question. Question generating is a flexible strategy to the extent that students can be taught and encouraged to generate questions at many levels.

Clarifying is an activity that is particularly important when working with students who have a history of comprehension difficulty. These students may believe that the purpose of reading is saying the words correctly; they may not be particularly uncomfortable that the words, and in fact the passage, are not making sense. When the students are asked to clarify, their attention is called to the fact that there may be many reasons why text is difficult to understand (e.g., new vocabulary, unclear referent words, and unfamiliar and perhaps difficult concepts). They are taught to be alert to the effects of such impediments to comprehension and to take the necessary measures to restore meaning (e.g., reread, ask for help).

Predicting occurs when students hypothesize what the author will discuss next in the text. In order to do this successfully, students must activate the relevant background knowledge that they already possess regarding the topic. The students have a purpose for reading: to confirm or disprove their hypotheses. Furthermore, the opportunity has been created for the students to link the new knowledge they will encounter in the text with the knowledge they already possess. The predicting strategy also facilitates use of text structure as students learn that headings, subheadings, and questions embedded in the text are useful means of anticipating what might occur next.

In summary, each of these strategies was selected as a means of aiding students to construct meaning from text as well as a means of monitoring their reading to ensure that they are in fact understanding what they read.

Initiation

Reciprocal teaching should be introduced to students with some discussion regarding the many reasons why text may be difficult to understand, why it is important to have a strategic approach to reading and studying, and how the reciprocal teaching procedure will help the students understand and monitor their understanding as they read.

The students are then given an overall description of the procedure, emphasizing that it takes the form of a dialogue or discussion about the text and that everyone takes a turn assuming the role of teacher in this discussion. To illustrate, the person who is assuming the role of teacher will first ask a question that he or she thinks covers important information that has been read. The other members of the group answer that question and suggest others they may have thought of. The "teacher" then summarizes the information

read, points out anything that may have been unclear, leads the group in clarifying, and, finally, predicts the upcoming content.

To ensure a minimal level of competency with the four strategies, the students receive practice with each of them. For example, the students summarize their favorite movie or television show. They then identify main idea information in brief and simple sentences and graduate to more complex paragraphs that contain redundant and trivial information. Each strategy receives one day of introduction.

Application

After the students have been introduced to each of the strategies, the dialogue begins. For the initial days of instruction, the adult teacher is principally responsible for initiating and sustaining the dialogue. This provides the opportunity for the teacher to provide further instruction and to model the use of the strategies in reading for meaning. The adult teacher may wish to call upon more capable students who will serve as additional models, but it is important that every student participate at some level. For some students, this participation may be such that they are noting one fact that they acquired in their reading. This is a beginning, and over time the teacher, through modeling and instruction, can guide these students toward a more complete summary.

As students acquire more practice with the dialogue, the teacher consciously tries to impart responsibility for the dialogue to the students while he or she becomes a coach, providing the students with evaluative information regarding the job they are doing and prompting more and higher levels of participation.

Source: Annemarie Sullivan Palincsar, "Reciprocal Teaching," *Teaching Reading as Thinking*, ASCD.

Research Base:

Brown, A., & Palincsar, A.S. (1982). Inducing strategic learning from texts by means of informed, self-control training. *Topics in Learning and Learning Disabilities*, 2(1), 1-17.

Palincsar, A.S., & Brown, A. (1985). Reciprocal teaching: Activities to promote "read(ing) with your mind." In T.L. Harris & E.J. Cooper (Eds.), *Reading, thinking, and concept development: Strategies for the classroom*. New York: The College Board.

K-W-L GROUP INSTRUCTION STRATEGY

developed by Donna Sederburg Ogle

Definition

K-W-L is a strategy that models the active thinking needed when reading expository text. The letters K, W, L stand for three activities students engage in when reading to learn: recalling what they **KNOW**, determining what they **WANT** to learn, and identifying what they **LEARN** as they read.

This strategy is designed to help students develop a more active approach to reading expository material. Teachers first model and stimulate the kinds of thinking needed for learning and then give students individual opportunities to write out what they know, what questions they want answered, and what they have learned from reading the text. In this way, the benefits of group instruction are combined with individual student commitment and responsibility.

The strategy was developed to translate current research findings about the active, constructive nature of reading into an instructional lesson format. In classroom testing, K-W-L has been shown to be an effective tool to help students become more active thinkers and to help them remember better what they read (Ogle, 1986). It has also been useful in helping teachers better communicate the active nature of reaidng in group settings.

The strategy is designed for group instruction and can be used with either whole classes or smaller groups. It can be used in all curricular area and at all grade levels where students are reading expository material.

Procedures

Preparation. The teacher must prepare by reading the material, determining a key content concept that can elicit the most pertinent knowledge about the topic and by producing student worksheets. (See samples following description.)

Group Instruction. The initial group portion of this strategy involves three basic components. First, the teacher engages students *in a discussion of what they as a group already know about the concept the teacher has selected to introduce the lesson.* The teacher lists this information on the chalkboard or overhead projector. When disagreements and questions emerge, the teacher notes them and suggests that students may want to include them on the center column as questions they want to have answered.

Second, after students have volunteered all that they can think of about the concept, they should be asked to *categorize the information they have generated.* The teacher may need to identify one general category that incorporates two or more pieces of information on the board to model the building of chunks or categories. (At this point, a teacher may also want to use a *semantic map* as described in preceding sections of the handout to categorize information.)

Third, after the students are somewhat familiar with this process, they should be asked to *anticipate the categories of information they would expect to have included in an article on the topic.* The categories of information identified will be useful in processing the information they read and in future reading of a similar nature.

Individual reflection. After the group introduction to the topic, students should be asked individually to *write on their own worksheet what they feel confident they KNOW about the concept.* They can also write down the categories they think are most likely to be included. At this time, the teacher should help students raise those questions that have emerged during the discussion or that come from thinking of the major categories of information they expect to find. Each students should be able to *think of at least three questions or issues that they WANT to learn about as they read and should write those on their individual worksheets.*

Reading. Students should be directed to read the text once they have focused both on what they know and what they want to find out from reading. Depending on the length and difficulty of the text and the class composition, the text can either be read as a unit or can be broken into sections for reading and discussion. As they read, students should use their worksheet, jotting down information they learn as well as new questions that emerge.

Assessment of learning. The final step in the process is to engage the students in *a discussion of what they have learned from reading.* Their questions should be reviewed to determine how they were resolved. If some have not been answered satisfactorily, students should be encouraged to continue their search for information.

References:

Anderson, R.C. (1977). The notion of schemata and the educational enterprise. In R.C. Anderson, R.J. Spiro, & W.E. Montague (Eds.), *Schooling and the acquisition of knowledge.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Anderson, C.W., & Smith, E.L. (1984). Children's preconceptions and content-area textbooks. In G. Duffy, L. Roehler, and J. Mason (Eds.), *Comprehension instruction: Perspectives and suggestions.* New York: Longman.

Ogle, D. (1986). The K-W-L: A teaching model that develops active reading of expository text. *The Reading Teacher, 39,* 564-570.

SEMANTIC MAPPING

Background Information

Semantic maps are diagrams which help students see how words are related to each other. The procedure activates and builds on student's prior knowledge and generally involves brainstorming and discussion of how new information links to this prior knowledge. The maps can be used for vocabulary and comprehension development as a prereading or postreading activity.

Semantic mapping is not a new instructional strategy; for a number of years it has been known as "semantic webbing", "plot mapping" and "semantic networking". An early reference on semantic mapping per se was a 1971 Journal of Reading article by M.B. Hanf entitled "Mapping: A technique for translating reading into thinking". However, leading proponents who helped popularize this approach were Dale Johnson and P. David Pearson who described and discussed semantic mapping in their 1978 books Teaching Reading Vocabulary (updated in 1984) and Teaching Reading Comprehension. A number of research studies have validated the effectiveness of semantic mapping, contributing to the increased support of this as an effective instructional strategy.

Initiation

While there are a number of variations to semantic mapping, the general steps involved are:

1. Write the chosen vocabulary word or story topic on the blackboard. Draw a box or circle around that word/term.

2. Encourage students to think of as many words or ideas as they can that relate to the selected word or topic.

3. Students may:

   - write their ideas on paper and then share those ideas in group discussion;
   - brainstorm ideas in a small group to share in large group discussion; or
   - orally share ideas together to generate a class semantic map.

4. Students' ideas are listed on the semantic map in categories which organize the words in a reasonable and related manner. These details or related words/ideas are written around the main word/topic.

5. Discussion of the semantic map is perhaps the most important part of the activity. Here students see how words/ideas are related, learn new words and find new meanings for words they already know. During discussion the teacher will focus on the ideas most appropriate to the lesson being taught, add new related ideas to the map, and help students to identify those ideas which do not appropriately fit the map.

SEMANTIC MAP

...for vocabulary development

Initiation

The instructor writes the word or concept to be studied on the blackboard and asks students to think of as many words as they can related to that word/concept. An alternate question to initiate the activity is "What do you think of when you see the word (topic)?"

Interaction

In small groups or as a whole group, the students brainstorm a list of words related to the key word/concept. These words are written on a sheet of paper or on the blackboard in a list.

Application

Construct the group semantic map by writing the brainstormed words in categories around the key word/concept. Have students suggest labels for these categories, if possible. The instructor may add words or ideas to appropriately complete the group semantic map. Discuss the group's semantic map, pointing out relationships and differences among words. Have students point out new words they learned from this map as well as new meanings for words they already knew.

Expansion

Have students look for words in the semantic map as they read an appropriate story. Students may also be asked to write a paragraph or short story. Students may also be asked to write a paragraph or short story using the words/concept from the semantic map.

SEMANTIC MAP
...before reading

The activity integrates information from several sources to build students' background knowledge for a topic to be studied. The instructor prepares for this activity by choosing several materials which provide information on the topic. These materials could include posters, pictures, maps, easy-to-read trade books, filmstrips, various high-interest, low-vocabulary reading materials and textbook or basal materials.

Initiation

The teacher writes the topic on the blackboard, draws a circle around the word, and tells students this topic will be studied. The teacher lists key vocabulary words on the blackboard, including a context phrase or sentence for each word.

Interaction

Write each key word on the semantic map as a category heading. Discuss each word, listing details students already know about these category headings in red chalk. Ask students to skim the basal textbook to find the key words in context. Discuss the uses/meanings of those words in the text and write those ideas on the semantic map in white chalk. (The different colored chalk indicates information from different sources.) Have students review the other materials (e.g., posters, filmstrips, library books) to find additional information which fits or relates to the categories on the semantic map. Write these ideas on the map in blue chalk.

Application

Have students read the textbook material, stopping at the end of each section to add information to the semantic map. Write this information in white chalk to indicate that the information came from the textbook. When the semantic map is completed, the teacher uses the map to help the students summarize or recap the information about the topic.

Expansion: Students use the semantic map to write a summary of the important facts and details about the topic.

SEMANTIC MAP

...after reading

Initiation

Tell students they are going to read a story about "(topic)". The teacher should provide enough context for the upcoming reading to help students make predictions about what they think will happen in this story. Introduce any key vocabulary words in context and then have students read the story silently.

Interaction

Write the title of the story in the center of the blackboard and draw a circle around it. On lines drawn from the circle, write key concepts or themes from the story. For example, these concepts/themes can include how the characters look, important problems and episodes in the story, how the characters feel or react, and outcomes of the story. Students suggest ideas for each of these concepts/themes based on what they remember from reading the story. Their ideas are written on the map.

Application

The teacher and students recap the story by reviewing the semantic map. Students then reread the story (orally or silently) to look for other important information that was not included on the map. As students find new information through this guided reading, it is added to the map.

Expansion

Students use the completed map to guide retelling of the story. If appropriate, have students role-play or act out the story. The map can also be used to structure a writing activity in which students write a summary of the story using the information on the map.

Examples of Using More Advanced Thinking Skills
in Chapter 1 Classroom Situations
(based on categories from Dimensions of Thinking, ASCD)

	READING	MATHEMATICS
Metacognition (Knowledge and control of self; knowledge and control of process)	Students write/predict the ending or beginning to a story. Student decides to reread a paragraph to make sure s/he understands the author's intent.	Students discuss and plan a method for solving a problem. One student explains to another why s/he chose to solve a problem using a certain strategy.
Critical and Creative Thinking (Focus is on how the process is carried out)	Students look for other solutions to a problem than how it is resolved in a story.	Students look for the pattern used by another for generating a sequence of numbers. Students generate their own sequence of numbers using a pattern of their choice.
Thinking Processes (Broader in scope; longer time to complete; "macro" processes; overlap, semi-ordered)	Students write their own story based upon one character of their choice from a different story. They must plan the story, write the story, and explain why they feel the new "fits" the character.	Students explore polygons with 3, 4, 5, 6, 7, and 8 sides by looking for relationships between the number of sides and other properties. They use this information for predicting patterns when there are more sides.
Core Thinking Skills (Essential to other dimensions; depend on process and content area; microprocess)	After reading a story, students are paired with the stated purpose of asking each other questions--to clarify, justify, add information.	Students draw pictures to represent a problem situation. Students use Cuisenaire rods to help them solve computation problems.

Creating a Climate for Thinking

Listening to Students

Appreciating Individuality and Openness

Encouraging Open Discussion

Promoting Active Learning

Accepting Students' Ideas

Allowing Time to Think

Nurturing Confidence

Giving Facilitative Feedback

Appreciating Students' Ideas

Source: Raths, Louis E. et al., (1986) Teaching for Thinking Teachers College, Columbia University, N.Y.

And Remember...

Reading Instruction in the Schools

Improving Students' Critical Thinking Skills

ELIZABETH HAYNES BURNETT and PAUL CONRAD BERG

Recent research conducted by the National Assessment of Educational Progress (NAEP) shows that there have been slight declines in inferential comprehension skills among 17-year-olds (Brown 1983). According to an article in the *National Assessment of Educational Progress Newsletter* (1981), results of tests showed that while reading abilities of 17-year-olds in literal comprehension and reference skills remained stable during the years between 1971 and 1980, their inferential comprehension skills declined 2.1 percentage points. In addition, some of these declines occurred among the most academically able students. Although 17-year-olds' performance in literal comprehension nationally was unchanged over the 1970–80 decade, between the assessments conducted in 1974–75 and in 1979–80, there were declines in literal comprehension skills in some of the groups (NAEP 1981). Such findings lead one to wonder about the nature of reading comprehension instruction at various grade levels and, in particular, about how reading comprehension should be approached in the middle school and high school.

While this slight decline in higher-level thinking skills may be explained by a combination of several factors, at least part of the explanation may relate to the nature of reading instruction itself. Today, many teachers approach reading as a series of skills taught in a planned sequence. In this process, the student's comprehension is directed solely by the textbook, and even by workbook drill or other exercises related to the textbook, and does not necessarily require in-depth response or articulation on the student's part.

Experience and observation have shown that many teachers use this process because it may be less time-consuming with large numbers of students who have a wide range of reading levels. It seems that much time is spent in the middle school and in the high school on workbook drills or on exercises that require brief answers and do not encourage the student to interpret the material that has been read. If the student is unable to interpret the material, his comprehension may be very limited.

The Durkin Study Related to Comprehension Instruction

In a study to determine whether comprehension was being taught in reading and social studies classes in grades three through six, Durkin found almost no comprehension instruction in the classes observed (Durkin 1978–79). In social studies classes, teachers apparently did not view social studies as a time for reading instruction. They spent most of the time having students master facts and cover subject matter, rather than improve reading comprehension. In reading classes, time was spent with written assignments, rote drills, workbooks, exercises, and ditto sheets. While students completed written work, teachers checked answers or corrected papers. Durkin concluded that "the overwhelming influence of workbooks and other assignment sheets was unexpected" (Durkin 1978–79, p. 524). In the classes observed, teachers used questioning mainly for the purpose of assessment, with emphasis on correctness of answers, rather than on improvement of comprehension. In addition, it seemed that from the time students became independent readers, teachers increased their written assignments and decreased their reading instruction (Durkin 1978–79).

In the classes observed in the Durkin study, written assignments took up much time, with heavy emphasis on the number of assignment sheets and exercises, increase of paperwork, the number of correct answers given, and filling in a blank space. In such classrooms the teaching of reading becomes equivalent with doing an activity, having an exercise monitored or checked, and writing a short answer. Reading is viewed as a set of discrete and isolated basic skills, and development of

Dr. Burnett is an associate professor in secondary education, and Dr. Berg is a professor in reading education, University of South Carolina.

the skills is accomplished mechanically, with emphasis more on assessment than on comprehension instruction.

Reading Instruction in the Middle School and High School

Educators are generally aware that the complexity of the advanced (beyond fourth grade) reading process requires the mastery of new content, new vocabulary, multiple meanings, connotative use of words, and critical evaluation. Reading educators have debated whether the reading process consists of the development of a series of skills taught in a sequence, whether it is best mastered by the student's own response to the textual material, or whether reading consists of both processes interacting at specific stages of reading development. When the student interprets and evaluates textual material, comprehension is thought of as a more complex process that requires thinking skills on the part of the reader.

A combined approach, on the other hand, requires both the mastery of basic skills and increased reader response. It would hardly seem possible for advanced reading to develop without early instruction in basic reading skills, as well as the student's gradually increased ability to interpret subject matter. While teaching a planned series of textbook skills may be more effective in the elementary stages of reading, an approach which requires dialogue from the student should be used increasingly for advanced reading after the student has learned decoding. Therefore, a combined approach that requires more and more interpretation by the reader should be the main strategy used for reading instruction in the middle school and in the high school. Several recommended strategies for use in this combined approach with increasing emphasis on the reader's response are described below.

Metacognitive Techniques

In the combined approach to reading instruction described above, the teacher of middle school or high school should use various metacognitive or thinking techniques to help the student monitor what he or she knows about a selection being read. This process is ongoing and cumulative during the act of reading. That is, before reading, the student assesses what he or she already knows about the selection, and, during the reading, the student maintains a continuous consciousness about what is being learned and organizes the information according to the purpose for which it is being read. The most widely used devices for initiating and maintaining this process are formulas that begin, for example: *"Survey before you read, raise questions about what you need to gain from the article, and then read the article, organizing your thoughts in relation to the purpose that caused you to read the selection."* Whatever the name of these metacognitive devices, they all have in common the steps in a thinking pattern that, if followed, will lead the student to think consciously about the information developed by the writer and then organize the accumulating facts, opinions, or whatever the writer has written into an organized, logical pattern.

Semantic Mapping

One technique to aid the student in thinking about the material is the use of semantic mapping. Metacognitively, the various techniques that fit under the rubric of semantic mapping are related to the previously mentioned systems of "survey, question, and read." However, semantic mapping goes a step further and shows the reader how to develop an organized visual pattern of the accumulating data. These maps that the reader draws, either during the reading or at the end of a semantic unit (for example, after each paragraph or after units of paragraphs), are graphic arrangements showing how the ideas and details within a unit or selection are related, with the major idea placed in a center block or circle, and the secondary ideas or supporting facts placed in circles at the end of spokes radiating from the central idea within the circle. Any third or tertiary order of ideas or details will appear in small circles at the end of spokes radiating from the secondary idea circle. There are many variations on this format. These are illustrated in a recent article by Sinatra et al. (1986) in the *Journal of Reading* and also in a recent International Reading Association (IRA) publication (Heimlich and Pittelman 1986).

Integrating Reading and Writing

Another technique for monitoring what the student knows is that of integrating reading and writing instruction. Teachers have generally found that one way to improve reading is to have students write down experiences or stories and read what they have written to peers or to themselves. Since writing development begins early in the educational process, young children should be encouraged to scribble, draw pictures, and write letters and words as early as they are interested in these activities. In the early grades they should be encouraged to write down stories, poems, experiences, and feelings to be shared with their peers. Many educators feel that children should generate a great deal of "free" writing, unhampered by intense correction, in the early years of schooling. In the middle and later years, their writing should reflect more discipline as it develops more shape and form.

One principle of learning that teachers generally recognize is that students learn more and retain material longer if the material is presented in a context that has meaning for them. In the book *Teacher*, Ashton-Warner (1963) described a method of teaching young

children to read by writing on a card a single word from their own experience, giving the card to them, and giving them a new card each day. In this way young children learned to read words that were meaningful to them.

In the past few years, a number of studies have indicated a substantial positive correlation between reading and writing abilities (Haynes 1978). Consequently, many educators have recommended that reading and writing experiences be integrated in the curriculum. These experiences should be on the student's level of interest and understanding and woven into a meaningful context with classroom subject matter. In one article, Atwell points out that children need to read, write, speak, and listen not to build skills, but to communicate with each other (Atwell 1983). In another article, Silvers (1986) contends that when teachers teach reading and writing as related processes rather than as isolated skills, greater learning occurs.

Questioning

Another strategy is that of asking questions during the learning process to facilitate comprehension. Questions should be used to give students an opportunity to think about what they have read and thus enhance comprehension. In order to reinforce what students know, questions should require students to articulate their thinking.

A recent publication by the College Entrance Examination Board stresses the importance of students being involved actively in the learning process by asking and answering questions, thinking, and articulating about the material so that they can use the information they are processing as they read (College Entrance Examination Board 1985). Further, one way to involve students in reading is described in an article by Shoop as a method of "investigative questioning," in which students conduct a dialogue with each other or with themselves, mentally asking and answering their own questions to involve readers with the narrative text (Shoop 1986). Also, Christenbury and Kelly report definite benefits of questioning in aiding students in the comprehension of content; questions can help students to find their own "voice" and to develop critical thinking skills through exploration, argument, and interaction with peers (Christenbury and Kelly 1983).

It seems that teachers generally pose more lower-order convergent questions to students of lower ability. Some research indicates, however, that higher-order questions benefited low-ability students the most (Christenbury and Kelly 1983). It may be concluded that teachers should try more divergent questions with lower-ability students and not limit their questions to the type that elicit mere concrete facts.

Further, Christenbury and Kelly conclude that there is a place in the curriculum for both convergent and divergent questions (Christenbury and Kelly, 1983). It seems safe to say that all students should have a variety of different types of questions. Some questions may ask for factual information, but probably most questions should ask for more than the facts that students should learn. Perhaps the best kind of question a teacher can use is the kind which stimulates critical thinking ability.

Conclusion

In conclusion, teachers should be more aware of including questions and strategies to foster skills in critical thinking and evaluation among students. Drills may be necessary for practice and for the reinforcement of skill development; they are undoubtedly more effective when the teacher makes clear the purpose and the thought process of the lesson. The exclusive use of drills, however, is far too limited for the student who must learn to think for himself. In the advanced stages of reading, the student must make continuous choices between what to discard and what to think critically about. In order to make inferences and to think critically, the student must use a combined process of decoding textual information and responding to the material, with a gradual increase in evaluating and restructuring the material. The advanced reader must be challenged to develop from the reading material the kind of dialogue that arises as he relates the subject matter to his growing knowledge and experience to form new patterns of thinking.

REFERENCES

Ashton-Warner, S. 1963. *Teacher*. New York: Simon and Schuster.

Atwell, M. A. 1983. Reading, writing, speaking, listening: Language in response to context. In *Teaching reading with the other language arts*, edited by Ulrich H. Hardt. Newark, Delaware: International Reading Association.

Brown, R. 1983. National assessment findings in the language arts. *English Journal* 72:106–109.

Christenbury, L., and P. Kelly. 1983. *Questioning: a path to critical thinking*. Illinois: ERIC Clearinghouse on Reading and Communication Skills and the National Council of Teachers of English.

College Entrance Examination Board. 1985. *Academic preparation in English*. New York.

Durkin, D. 1978–1979. What classroom observations reveal about reading comprehension instruction. *Reading Research Quarterly* 14:481–533.

Harris, T. L., and R. E. Hodges (Eds.). 1981. *A Dictionary of reading and related terms*. Newark, Delaware: International Reading Association.

Haynes, E. F. 1978. Using research in preparing to teach writing. *English Journal* 67:82–8.

Heimlich, J. E. and S. D. Pittelman. 1986. *Semantic mapping: Classroom applications*. Newark, Delaware: International Reading Association.

National Assessment of Educational Progress. 1981. Elementary reading skills improve. *National Assessment of Educational Progress Newsletter* 14(Spring):1–3.

Shoop, M. 1986. InQuest: A listening and reading comprehension strategy. *The Reading Teacher* 39:670–74.

Silvers, P. 1986. Process writing and the reading connection. *The Reading Teacher* 39:684–88.

Sinatra, R., et al. 1986. Using semantic mapping after reading to organize and write original discourse. *Journal of Reading*, 30:4–13.

Toward Asking the Right Questions

The Beautiful, the Pretty, and the Big Messy Ones

ROBERT J. KLOSS

Many years ago when an undergraduate, I ran across this saying of e.e. cummings: "Always the beautiful answer who asks a more beautiful question." Enchanted by its syntax, I became enthralled by its intuitive, powerful truth. When I became first a high school teacher and then a college professor, I conscientiously worked at practicing the skill of asking beautiful questions. I admit that some were perhaps merely pretty and quite a few downright ugly, but more often than not they were real questions and not absolute statements of what I myself believed to be true of anything. After more than twenty-five years of reasonable success, I was surprised when observing colleagues' classes that so few challenging questions were part of the negotiation of meaning taking place. Afraid that my personal experiences were skewed in some way, I reviewed the literature on questioning in classrooms on all levels.

The news was, as so much of it seems to be these days in education, bad. Recent research to determine whether teachers are asking higher-level questions shows the answer repeatedly to be an unqualified and resounding no. Delva Daines (1986) has reported that 93 percent of the questions asked by elementary and secondary teachers were at the literal level of comprehension, and 88 percent of the students' answers—regardless of the teaching style and grade level—were also at this, the lowest level of cognitive skills. Daines has implicated teachers' communication habits in this discouraging finding, concluding that the "constant model of asking literal questions and repeating students' answers to low order questions seems to connote to students that teachers expect them to perform at the factual and recall level of thinking" (p. 373). These results are particularly depressing when one notes that more than half a century ago, Stevens (1912) discovered that two-thirds of the questions asked in a typical classroom required only recitation of a memorized text as a satisfactory answer.

Carole Barnes, who has studied questioning in higher education (1983), came to virtually an identical conclusion: the "overwhelming percentage of questions asked by college professors regardless of institution were on the lowest cognitive level (cognitive memory)" (p. 66). Barnes was clearly disappointed. She anticipated that beginning courses would routinely deal more with factual information and that advanced courses should be expected "then, to synthesize and relate concepts, to draw hypotheses and conclusions; but this did not happen" (p. 78). Regardless of subject or level, teachers' questioning strategies remained exactly the same.

Further, the outlook for improvement is not good. In her synthesizing research on the use of questioning in teaching, Gall (1984) concluded that pleas for teachers to use more higher-level questions usually fall on deaf ears because they tend primarily to help students learn the curriculum, which is textbook driven. Wolf (1987), in "The Art of Questioning," agrees and adds that teachers tend to ask many rote questions because their classes are too heterogeneous to do otherwise, and because they themselves are aware that skillful question asking must be constant and consistent so that it becomes an art, unconsciously practiced. Since their superiors do not value this art highly, however, few teachers are willing to devote time and energy to cultivating it. Most are content with the status quo routine of covering the text by June.

In the conclusion of her study, however, Barnes points out a direction to remedy this situation. She suggests that if critical thinking is a stated goal, questioning levels and patterns may not be as important as looking harder at the matter of cognitive skills. It is thus possible for instructors to concentrate on critical thinking strategies and simultaneously improve their questioning skills in the classroom.

As most teachers know, many lists of cognitive skills have been delineated. Multiple taxonomies, from Sternberg's (1985) psychological schema to Lipman's (1977)

Dr. Kloss is a professor of English at The William Paterson College of New Jersey in Wayne, New Jersey.

philosophical one, are available for any educator's consideration. Joan Gubbins (1985) of the Connecticut State Department of Education has surveyed most of these and produced a matrix of thinking skills that incorporates those listed by most theorists. That brief list formulated by Benjamin Bloom (1956) is in my experience probably most useful for considering the relationship of cognitive levels to question asking. The six levels set forth in this taxonomy provide not only a structural model for the creation of questions but also a means of assessment and evaluation, increasingly important in these days of calls for accountability.

Bloom posited six cognitive operations in a hierarchy in which the operation above subsumes all those preceding it. Moving from lowest to highest, these levels are first, that of knowledge, a prerequisite for all operations to follow. Comprehension is the next level, on which one must go beyond knowledge by understanding what one knows. At the next level is application, higher because one must be able to apply what he has comprehended. Then comes analysis, in which the individual must be able to break down into its parts the knowledge applied and comprehended. Higher still is synthesis, which requires the creative combination of knowledge analyzed from several domains. Finally, evaluation, the highest operation, requires critical appraisal of the knowledge one has analyzed and synthesized.

Teachers who want to improve their questions, whether for essay tests or class discussions, will discover that constructing them on Bloom's model will make their task much simpler. In so doing, they will also guarantee a mix of questions on all cognitive levels and constrain students to perform the necessary critical thinking to answer them.

Several years ago, I formulated a series of questions for the study of *Huckleberry Finn*. The following are a sampling used specifically for discussion of Chapter 31, the critical point in Huck's young life when he decides not to turn his friend and traveling companion Jim, Miss Watson's slave, in to the authorities, choosing instead to "go to hell." Each question is preceded by the cognitive level, a definition, and examples of verbs used to create questions appropriate to that level:

Knowledge is the ability to remember material previously learned. The verbs that direct the performance of this skill are words such as define, describe, identify, name, and state. Question: When Huck decides not to turn Jim in to the authorities and tears up the letter to Miss Watson, what does he say?

Comprehension is the ability to grasp the meaning of material. Verbs indicating the performance of this skill are, for example, describe, explain, restate, summarize, and paraphrase. Question: Why does Huck decide not to turn Jim in? Explain.

Application is the ability to use learned material in new, concrete situations. This operation can be assessed by such verbal directives as interpret, use, illustrate, demonstrate, relate, and solve. Question: Have you ever stood by a friend when he or she was in serious trouble?

Analysis is the ability to break down material into its components so that its organizational structure can be understood. This skill is indicated by such verbs as distinguish, compare, contrast, analyze, and select. Question: Compare Huck's reasons for turning Jim in to his reasons for not doing so. What tips the balance, finally?

Synthesis is the ability to put parts together in such a way as to form a new whole. This operation can be assessed by use of verbs such as compose, create, hypothesize, devise, design, and construct. Question: Construct a situation in which you would feel justified in standing by a friend who had, as Jim had, broken the law.

Evaluation is the ability to judge the value of material for a given purpose. This can be assessed by verbs like judge, evaluate, choose, estimate, and criticize. Question: In your judgment, is it better to betray a friend than to betray the government? Why or why not?

Similarly, questions can be constructed to explore other forms of literature. The following illustrate possibilities for study of Robert Frost's "Stopping by Woods on a Snowy Evening":

- Knowledge: Who is the narrator of the poem and what is his situation?
- Comprehension: Explain the dilemma the narrator experiences.
- Application: Have you ever found yourself torn between two choices like these?
- Analysis: Distinguish between needs and responsibilities. Give examples.
- Synthesis: Hypothesize what would happen if we all chose *either* responsibility *or* need each time we faced such a choice.
- Evaluation: Evaluate the effectiveness of the poem's statement by answering the following question: Three weeks ago you agreed to go to a rock concert with two close friends. Two days before the concert, someone you have been dying to go out with for a long time calls you and asks you out for the same evening. What do you do?

Bloom's hierarchy can also be used to examine writing skills and teach linguistic concepts, sometimes in a literary context. Students usually have difficulty with Shakespeare's and Chaucer's language and with dialects that are unfamiliar to them whether black vernacular English, Yiddish, or any of the varieties of modern American speech. The following questions would thus be appropriate for an examination of the opening

paragraphs of *Huckleberry Finn*, which introduce the narrator and central character:

- Knowledge: What characteristics of Huck's language make it different from the language you hear every day?
- Comprehension: Explain how Twain uses Huck's language to develop his character.
- Application: Where and when have you ever used or heard any of the expressions Huck uses?
- Analysis: Why are expressions of Huck's, such as "ain't" and "couldn't stand it no longer," condemned by English teachers?
- Synthesis: Create two situations, one in which it would be "wrong" for you to use an expression of Huck's and one in which it would be "right."
- Evaluation: Does your language tell other people as much about you as Huck's tells you about him?

It should be emphasized that the questions are not necessarily to be asked in the order listed but employed as the teacher finds useful or convenient. Questions of evaluation can begin a lesson; questions of knowledge can end one. As the teacher becomes more skilled in questioning, the lesson will develop its structure organically out of the inquiry itself.

Collins and Stevens (1982) have concluded that inquiry methods are indeed effective in "teaching thinking skills and in teaching deep understanding of rules or theories" (p. 97). And Dunkin and Biddle (1974), more specifically, have demonstrated through research that employing Bloom's taxonomy works in classroom questioning. Teachers trained and induced to use it produce students more likely to use it themselves. This latter result overcomes one of the obstacles that Gall (1984) found to interfere with effective questioning—students needing to learn the response requirements of different types of questions. Gall saw the answer process to consist of a number of steps in which students first attend to the question, decipher its meaning, generate a silent answer, and finally give an overt one, which they revise as needed.

Students who themselves practice creating questions on Bloom's paradigm become proficient as well in answering questions. I make it a habit to require students to create questions, occasionally even on tests. In one of my linguistics tests, for instance, I quote from a dialect atlas a paragraph that discusses the variant pronunciations of the word "aunt." This passage indicates that, up and down the Eastern seaboard, each pronunciation is considered either a mark of cultivation or of ill-breeding by one social class or another. The questions that follow the passage are:

1. What is the correct pronunciation of "aunt"?
2. How can you rewrite the first question so that it can be more reasonably answered?

Most students recognize through this exercise that values do not inhere in language but are imposed from without, and that their recast question must both reflect this and elicit an answer more complex than a simple right or wrong. In performing this operation, they thus move from knowledge to critical evaluation on Bloom's levels. An instructor consciously using the hierarchy can soon develop questioning techniques that move students from facts to more highly complex ideas, perhaps even to insight, in any subject in the curriculum.

Indeed, Metfessel et al. (1971) have made the teacher's job easier by tabulating, for both the cognitive and affective domains, the governing verbs and direct objects that commonly accompany them. For instance, on the level of knowledge, some of the verbs are *recall, identify, recognize*; some of the direct objects are *properties, examples, symbols, rules*. These tabulations enable instructors to write educational objectives that are more meaningful, and they direct us to another advantage of the taxonomy. Any teacher who uses it will of necessity be clarifying his own objectives with precise language and simultaneously providing the means to assess the success or failure of the lesson. Some of my objectives in the exercise on the word "aunt," for instance, would be stated as follows: (1) The student will be able to comprehend a primary linguistic source (Comprehension). (2) The student will be able to interpret the significance of variants in pronunciation (Application). (3) The student will be able to judge the significance of the pronunciation in relation to social class (Evaluation).

To the degree that students display these abilities in their answers the question has been successful. Careful framing of questions at the beginning automatically builds in the means of final assessment.

Asking questions is a slower means of teaching than lecturing. The reflective teacher must, however, make a reasonable cost-benefit analysis. Teachers will find that at first they must slow up as they and their classes become accustomed to the new questioning style. But eventually they resume their pace, having gained increased student learning and improved student attitudes toward learning itself. Dave Schumaker (1985) describes vividly the transformation in his students as a result of higher-order questioning. "They pay attention; they listen to each other and give answers that show they are thinking about what they are going to say. I find that the quality of their questioning has also improved; they seem to have a better understanding of the concepts and are showing improvement in tests and written work" (p. 130).

Schumaker's experience is testimony to the success of inquiry methods and speaks eloquently to most of the objections teachers raise to questioning as a classroom technique. In addition, it addresses and demonstrates how to solve a problem that Wolf (1987) noted—teach-

ers tend to monopolize discussions and students almost never address each other in class. Asking questions, then, can help the teacher step back a little and allow those who should be most involved in learning—the students—come forward as full and equal participants in the collaborative adventure of the mind.

If an introduction to Benjamin Bloom's (1956) taxonomy does not magically allow one to create an instantly "more beautiful" question, it does at least help the instructor formulate pretty ones. And these questions guide students' critical thinking toward asking themselves the big messy questions each of us is called upon to answer daily both in class and in life. Students can learn to find a question in a text, a document, a painting, or a musical piece and, having found it, begin to address an answer. Hopefully, they also become aware that there just might be many answers to the same significant question. All of my students are required to become more aware, reflective, and articulate. Asking and answering questions together daily helps them and me move a little closer to this objective.

REFERENCES

Barnes, C. 1983. Questioning in college classrooms. In *Studies of College Teaching*, edited by C. Ellner and C. Barnes. Lexington, Mass.: D. C. Heath.

Bloom, B. (ed.), M. D. Englehart, E. J. Furst, W. H. Hill, and D. R. Krathwohl. 1956. *Taxonomy of educational objectives: Handbook I—the cognitive domain*. New York: McKay.

Collins, A., and B. Stevens. 1982. Goals and strategies of inquiry teachers. In *Advances in Instructional Psychology* (Vol. 2), edited by R. Glaser. Hillsdale, N.J.: Lawrence Erlbaum Associates.

Daines, D. 1986. Are teachers asking higher level questions? *Education*, 6(4):368–74.

Dunkins, M., and B. Biddle. 1974. *The study of teaching*. New York: Holt, Rinehart and Winston.

Ellner, C., and C. Barnes, eds. 1983. *Studies of college teaching*. Lexington, Mass.: D. C. Heath.

Gall, M. D. 1984. Synthesis of research on teachers' questioning. *Review of Educational Research* 42:40–46.

Gubbins, E. J. 1985. Matrix of thinking skills. (unpublished document). Hartford, Conn.: State Department of Education.

Lipman, M., A. M. Sharp, and F. S. Oscanyan. 1977. *Philosophy in the classroom*. Upper Montclair, N.J.: Institute for the Advancement of Philosophy for Children.

Metfessel, N., W. B. Michael, and D. A. Kirsner. 1971. Instrumentation of Bloom's and Krathwohl's taxonomies for the writing of educational objectives. In *Perspectives in individualized learning*, edited by R. Weisgerber. Palo Alto: American Institutes for Research.

Schumaker, D. 1985. But . . . do I have the time to do it right? In *Developing minds: A resource book for teaching thinking*, edited by A. Costa. Alexandria, Va.: Association for Supervision and Curriculum Development.

Sternberg, R. J. 1985. *Beyond IQ: A triarchic theory of human intelligence*. New York: Cambridge University Press.

Stevens, R. 1912. The question as a measure of efficiency in instruction: A critical study of classroom practice. *Teachers College Contributions to Education*, 48, n. p. Cited in Wolf, p. 6.

Wolf, D. 1987. The art of questioning. *Academic Connections*, Winter, 1–7.

STRIVING FOR MORE:

Advanced Skills in Chapter 1

Transparency 1

Thinking - along Strategies

guessing

using prior knowledge

predicting

adjusting predictions

setting

role-playing

reaction & opinion analysis

emotional involvement

summarizing

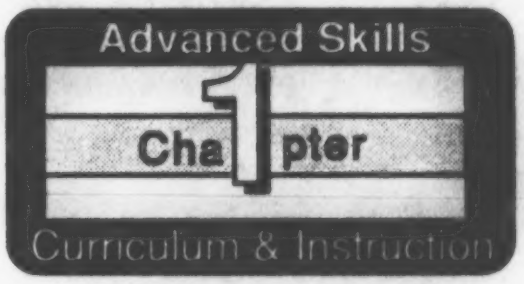
mental pictures

with-holding judgment

re-reading

using hands & body

Transparency 2



Workshop Goals

As a result of this workshop, participants will:

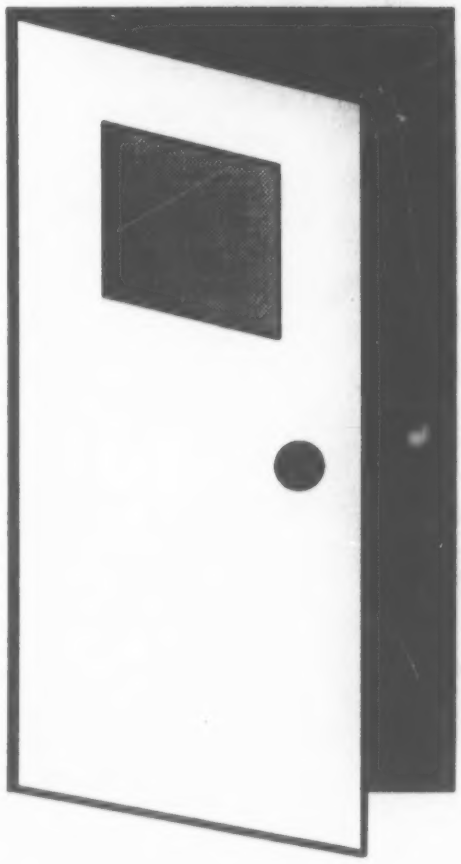
1. understand the requirements for teaching advanced skills specified in Chapter 1 instruction;

2. become familiar with current research and with terminology and issues associated with critical thinking and advanced skills;

3. learn specific strategies for integrating advanced skills in Chapter 1 instruction.

Transparency 3

"Why Advanced Skills?"



Transparency 4

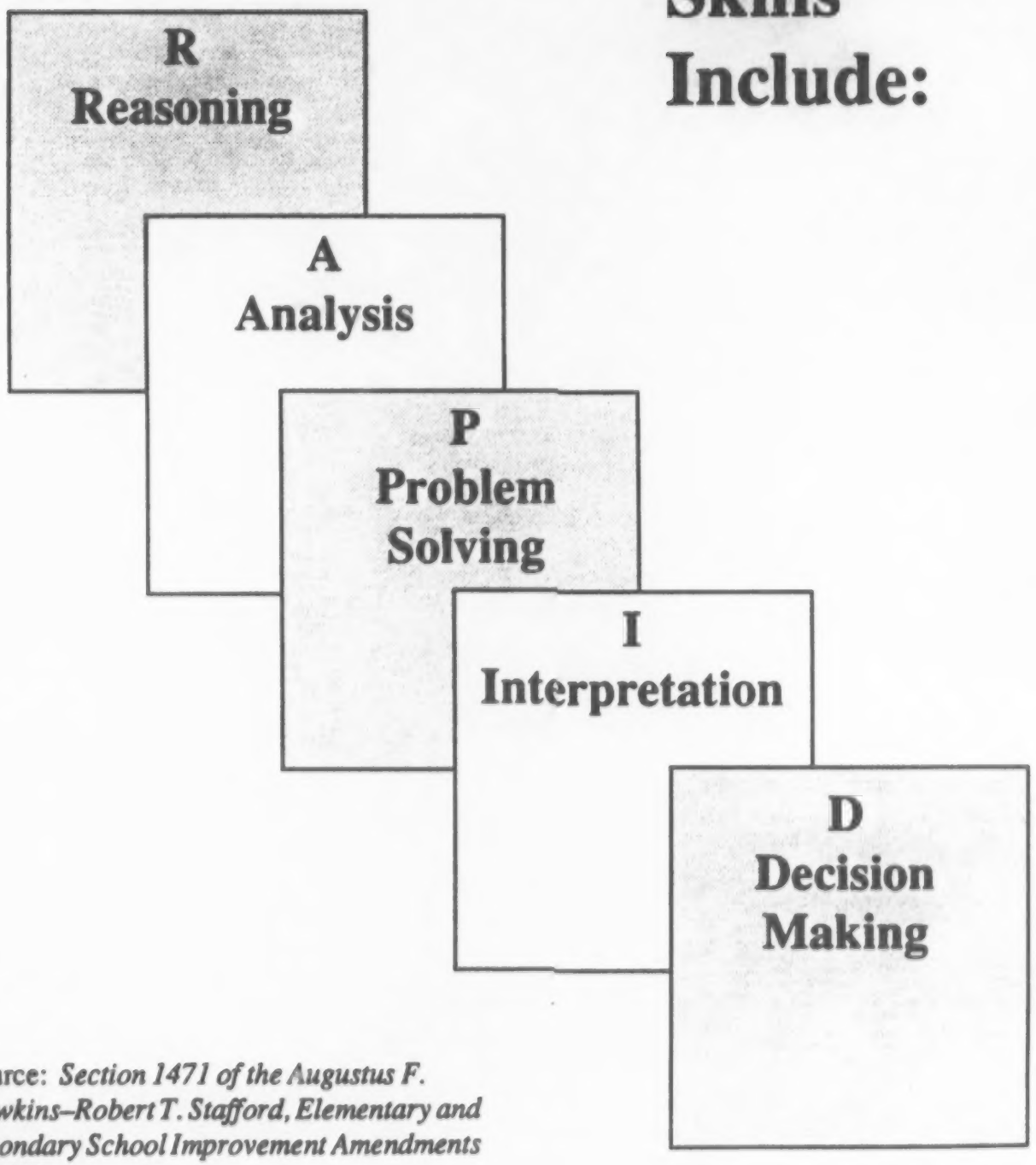
PURPOSES OF CHAPTER 1

To improve the educational opportunities of educationally deprived children by helping them:

- succeed in the regular program
- attain grade-level proficiency
- improve achievement in basic and more advanced skills

Transparency 5

More Advanced Skills Include:



Source: *Section 1471 of the Augustus F. Hawkins–Robert T. Stafford, Elementary and Secondary School Improvement Amendments of 1988*

Transparency 6

In the Past

Compensatory programs focused almost exclusively on lower order basic skills.....

Source:
The Current Operation of the Chapter 1 Program.
National Assessment of Chapter 1, 1987

The Myths

about Chapter 1 students:

They have less ability.

They have no language.

They can only learn through a restricted curriculum.

They cannot learn to think critically until they have mastered the basics.

Transparency 9

The Facts

Studies show that academically disadvantaged students benefit from the teaching of thinking strategies.

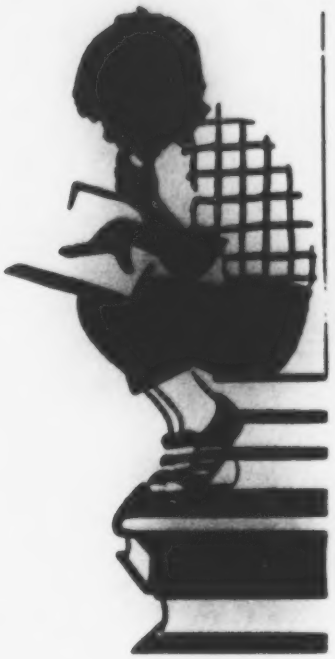
Students do not remember, especially over an extended period, what is not meaningful to them.

Students who come from a background that is not rich in language need an enriched, not an impoverished, curriculum.

Transparency 10

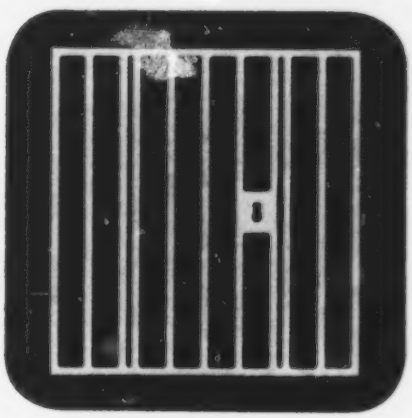
Thinking

CAN be taught.



Transparency 11

"None of this is easy. Our own history is our enemy."



Transparency 12

"Questions to ask ourselves"

Transparency

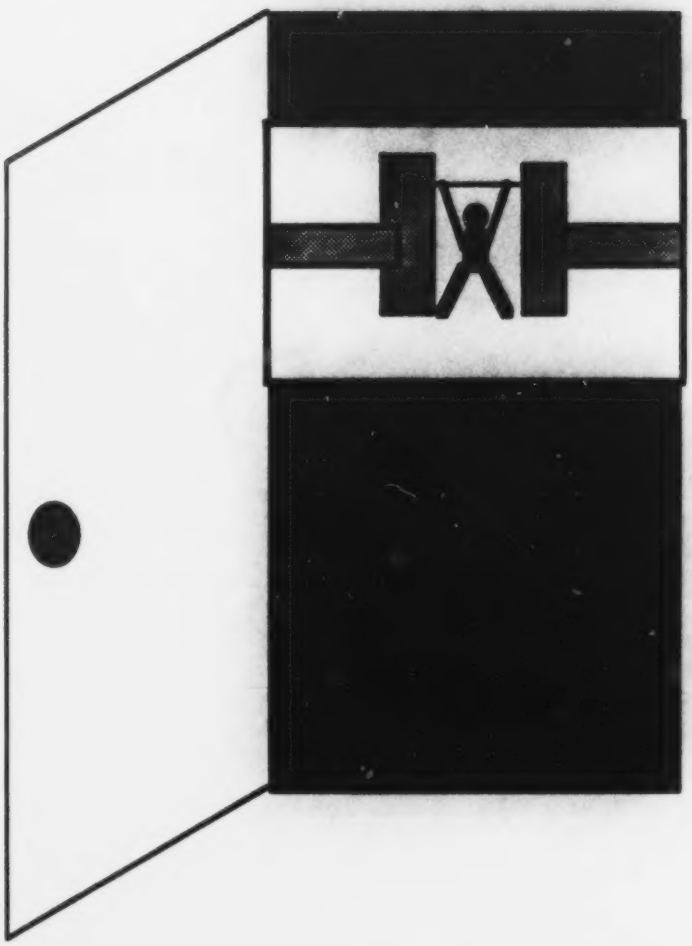
Do we really want students to think?

Do we want them to become more critical and more questioning and less likely to accept things at face value?

Do we want more critical debate and less reliance on the teacher?

Transparency 13

"What Advanced Skills?"



Transparency 14

WHAT ?

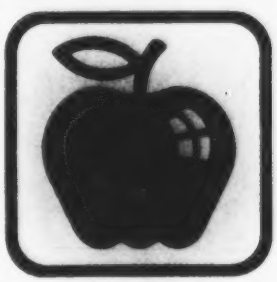
Transparency

Just as long as we know we're talking about "thinking"...

a skill that needs to be nurtured

nurtured in a way that goes beyond our typical classroom activities ...

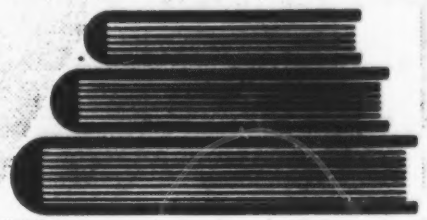
then we know we are evolving and the process can begin.



Transparency 15

Dimensions of Thinking: A Framework for Curriculum and Instruction

Robert J. Marzano
Ronald S. Brandt
Carolyn Sue Hughes
Beau Fly Jones
Barbara Z. Presseisen
Stuart C. Rankin
Charles Suhor

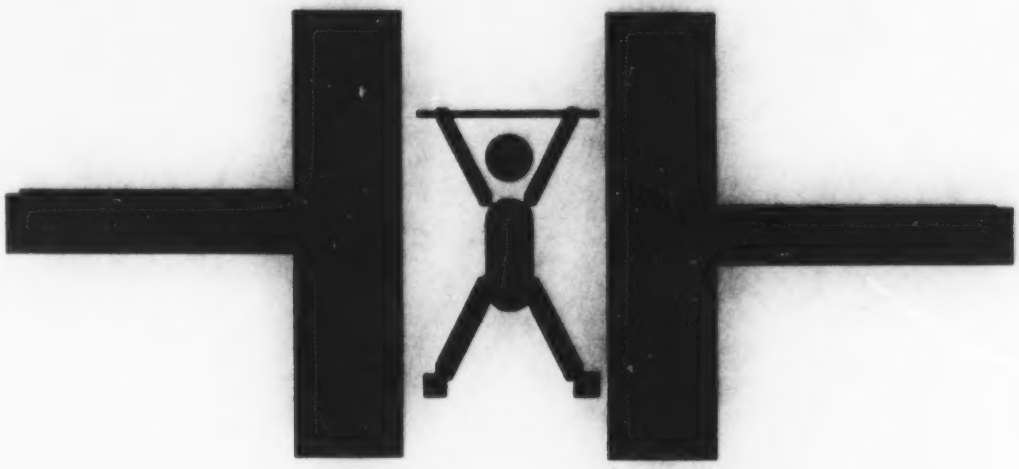


Association for Supervision and Curriculum Development

Alexandria, Virginia

Transparency 16

WHEREFORE . . .



or

Tight-spots

and

other opportunities

Transparency I7

M	T	W	T	F

not embedded

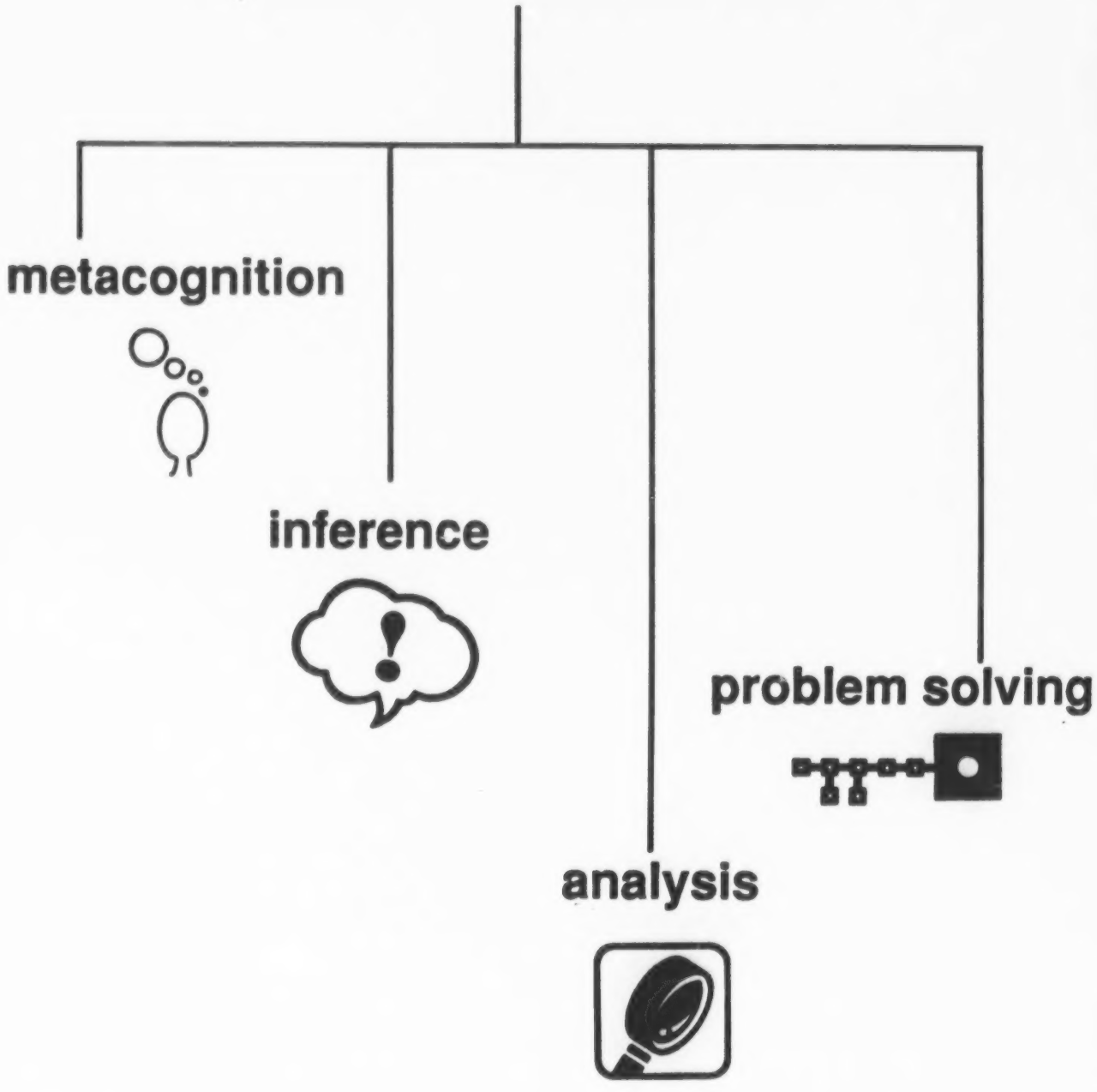
vs

embedded

M	T	W	T	F

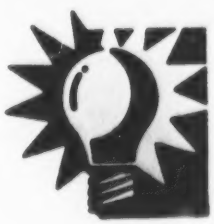
Transparency 18

STRATEGIES



Presentation Format

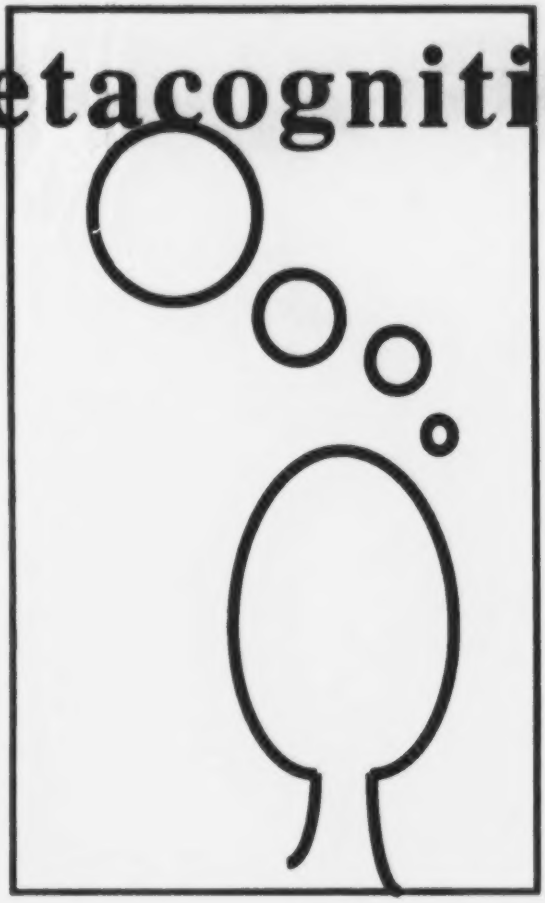
Awareness Example



Instructional Idea

Transparency 20

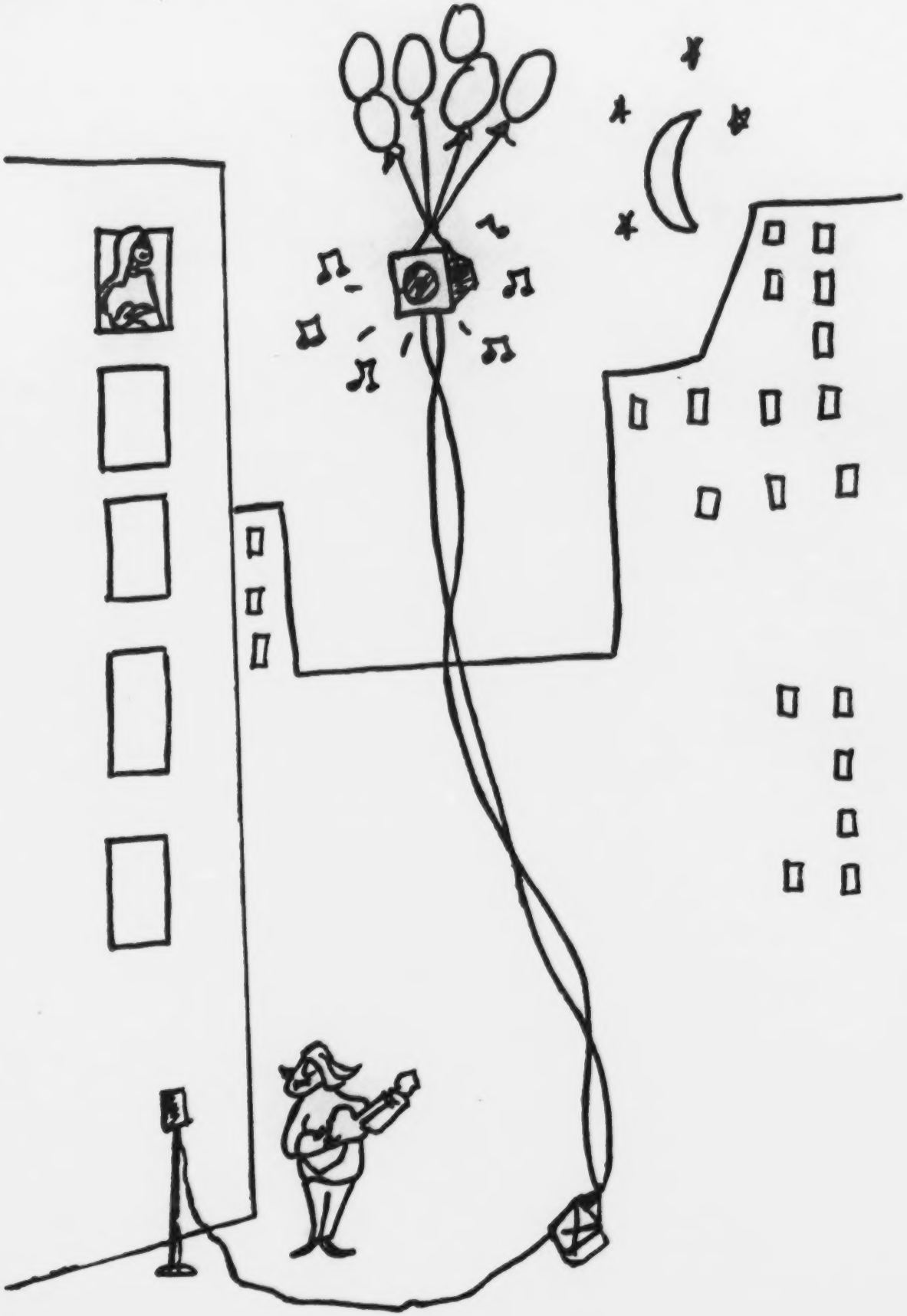
Metacognition



"thinking about thinking"

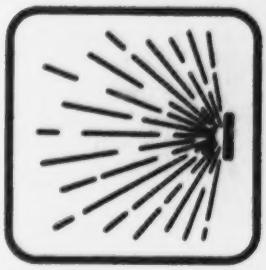
Transparency 21

T21a



T21b

Think along



Think aloud

Teacher models the process

Students learn to frame higher-order questions

Students gain awareness of strategies used

Students adapt awareness to their reading

Transparency 22

Thinking - along Strategies

guessing

using prior knowledge

predicting

adjusting predictions

setting

role-playing

reaction & opinion analysis

emotional involvement

summarizing

mental pictures

with-holding judgment

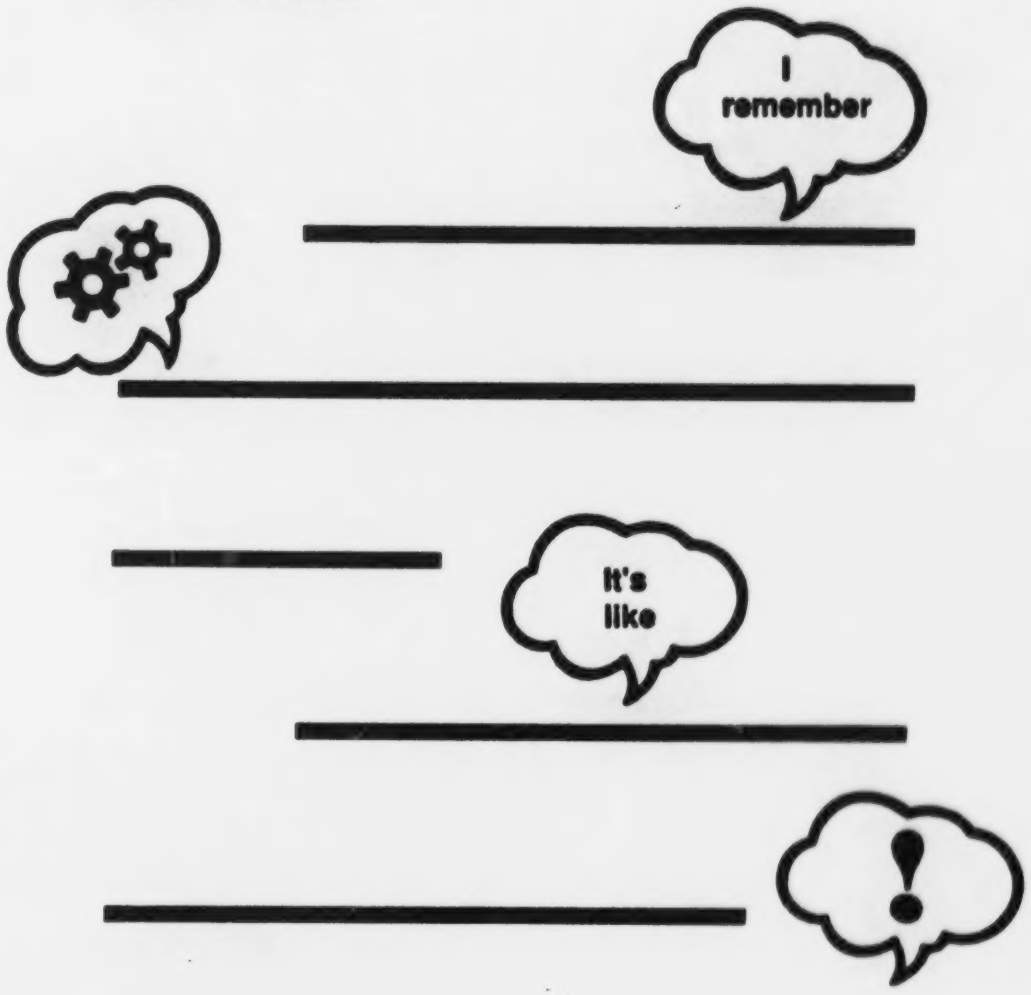
re-reading

using hands & body

Transparency 23

Inference

reading
between & beyond
the lines



Transparency 24

ReQuest

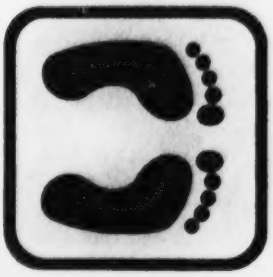
Read

student
asks questions
of teacher

teacher answers
student's questions

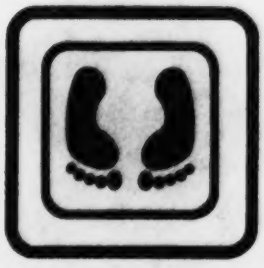
Keep reading

teacher
asks questions
of student



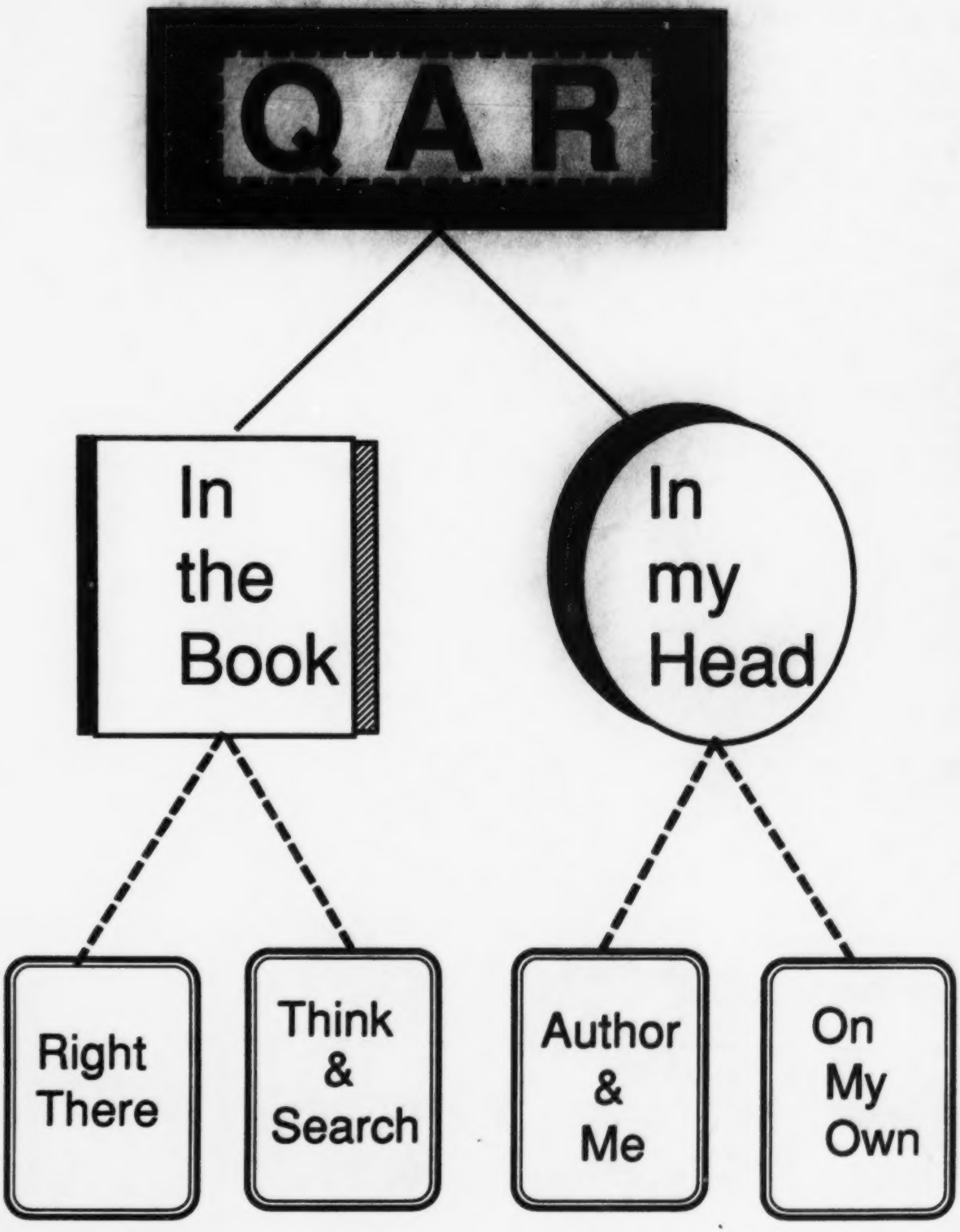
student answers
teacher's questions

Repeat
with next
text block
until

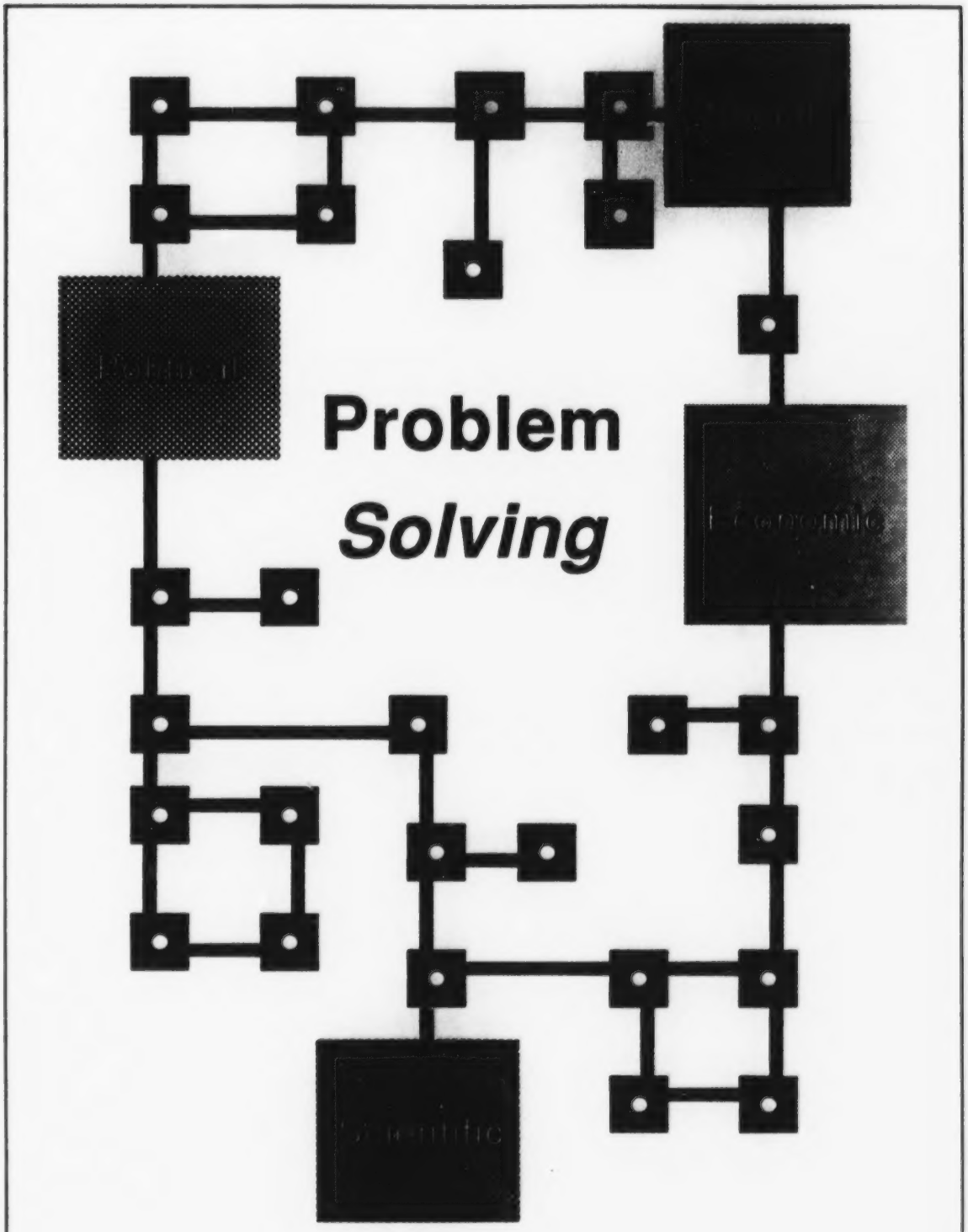


student can make
own predictions

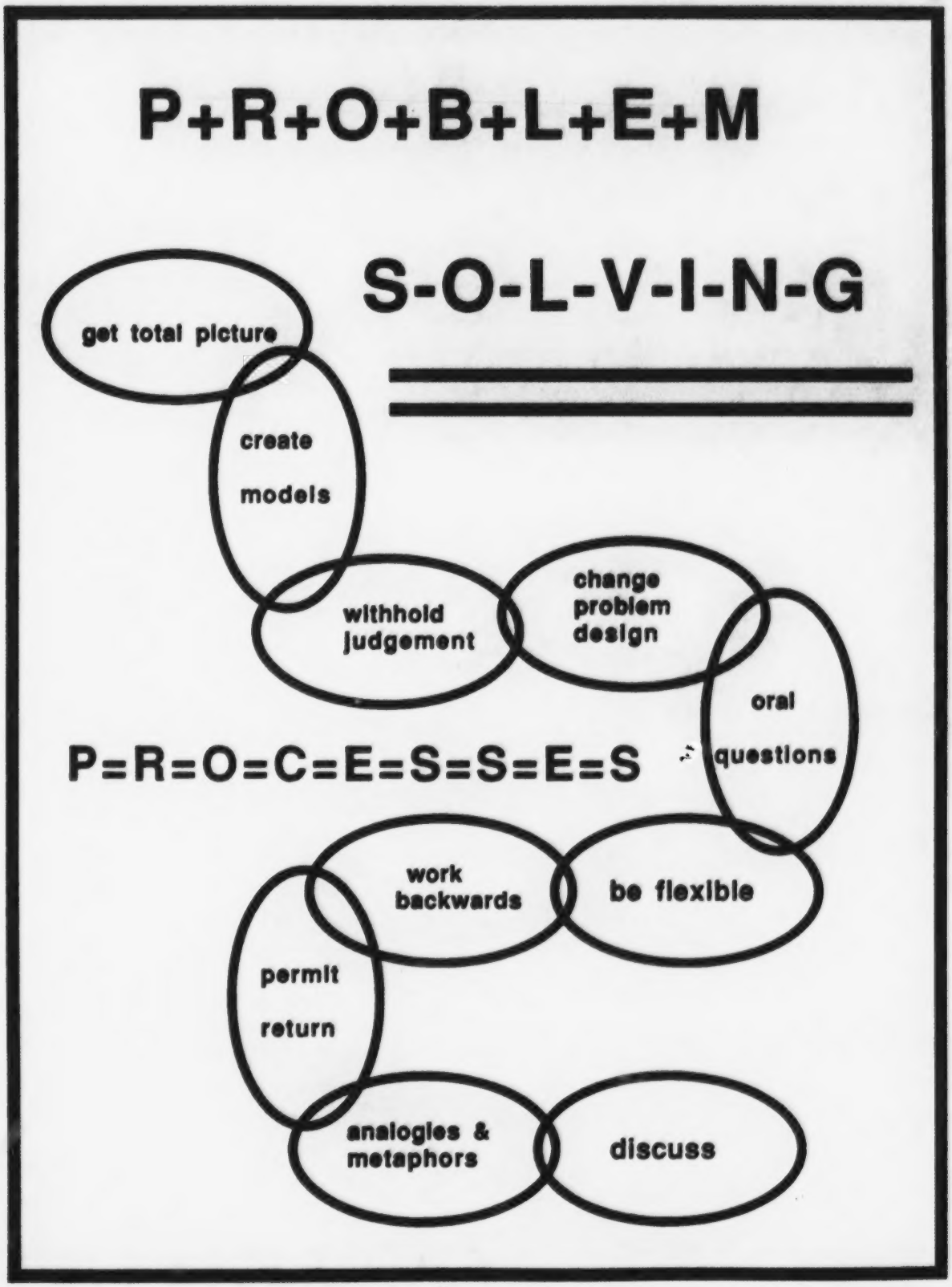
Transparency 25



Transparency 26

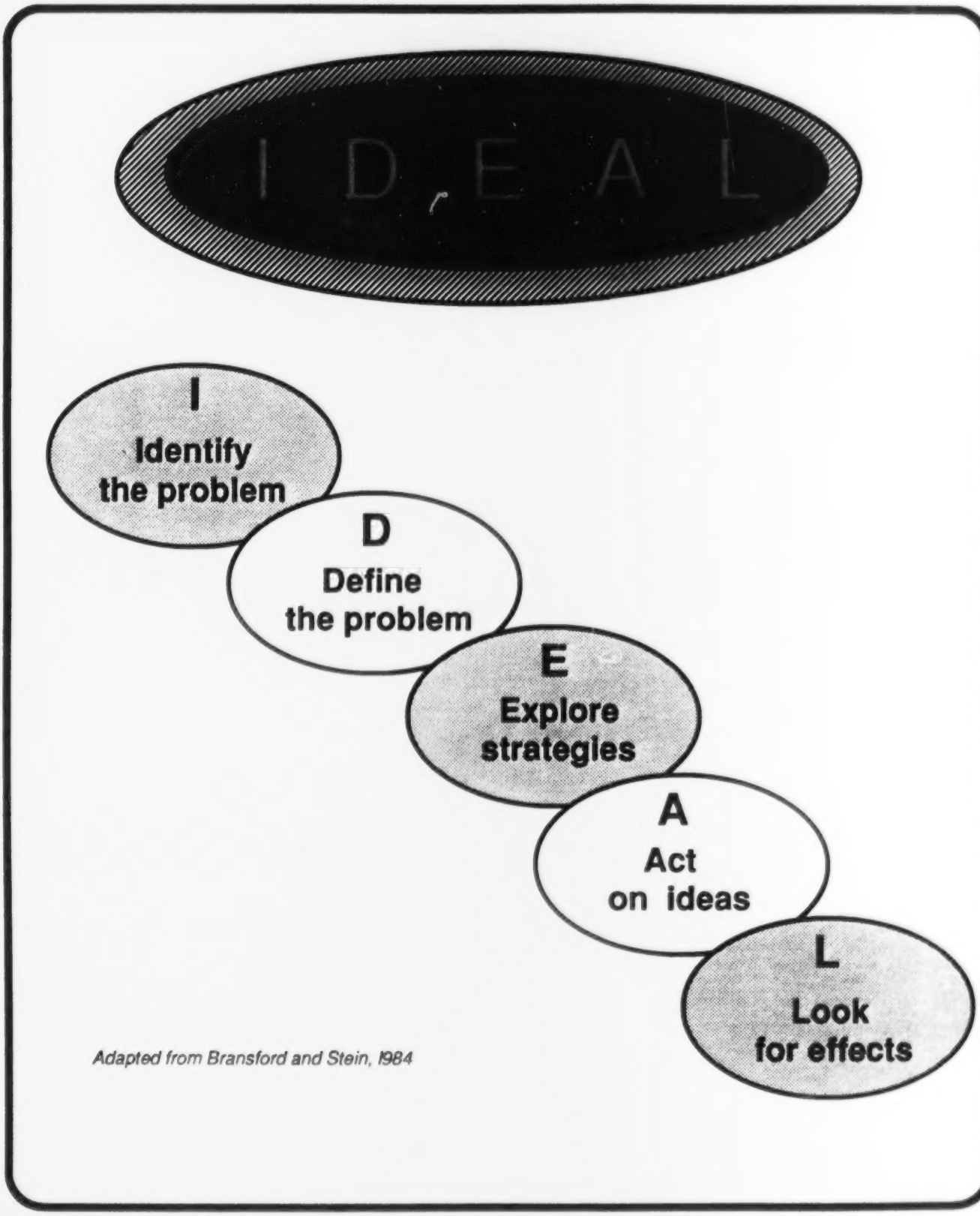


Transparency 27



Adapted from "Dimensions of Thinking...," (1988), ASCD, 46.

Transparency 28

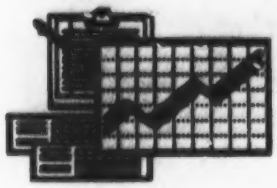


Adapted from Bransford and Stein, 1984

Transparency 29

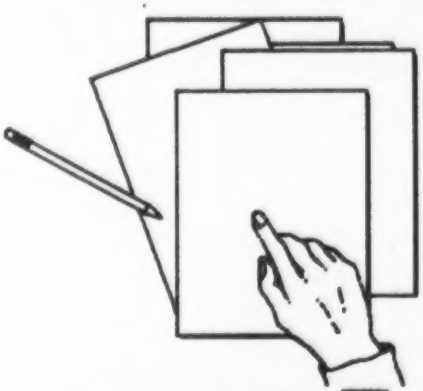
Step 1: ***Read***

Step 2: ***Explore***



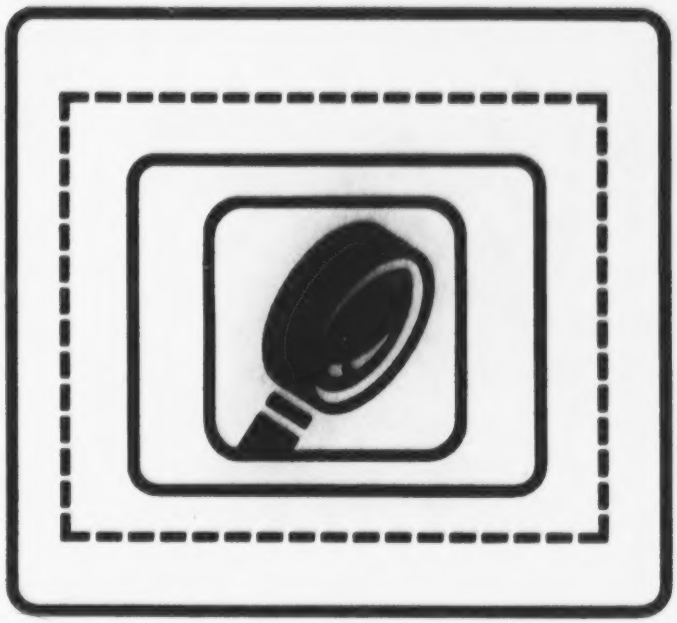
Step 3: ***Select a Strategy***

Step 4: ***Solve***

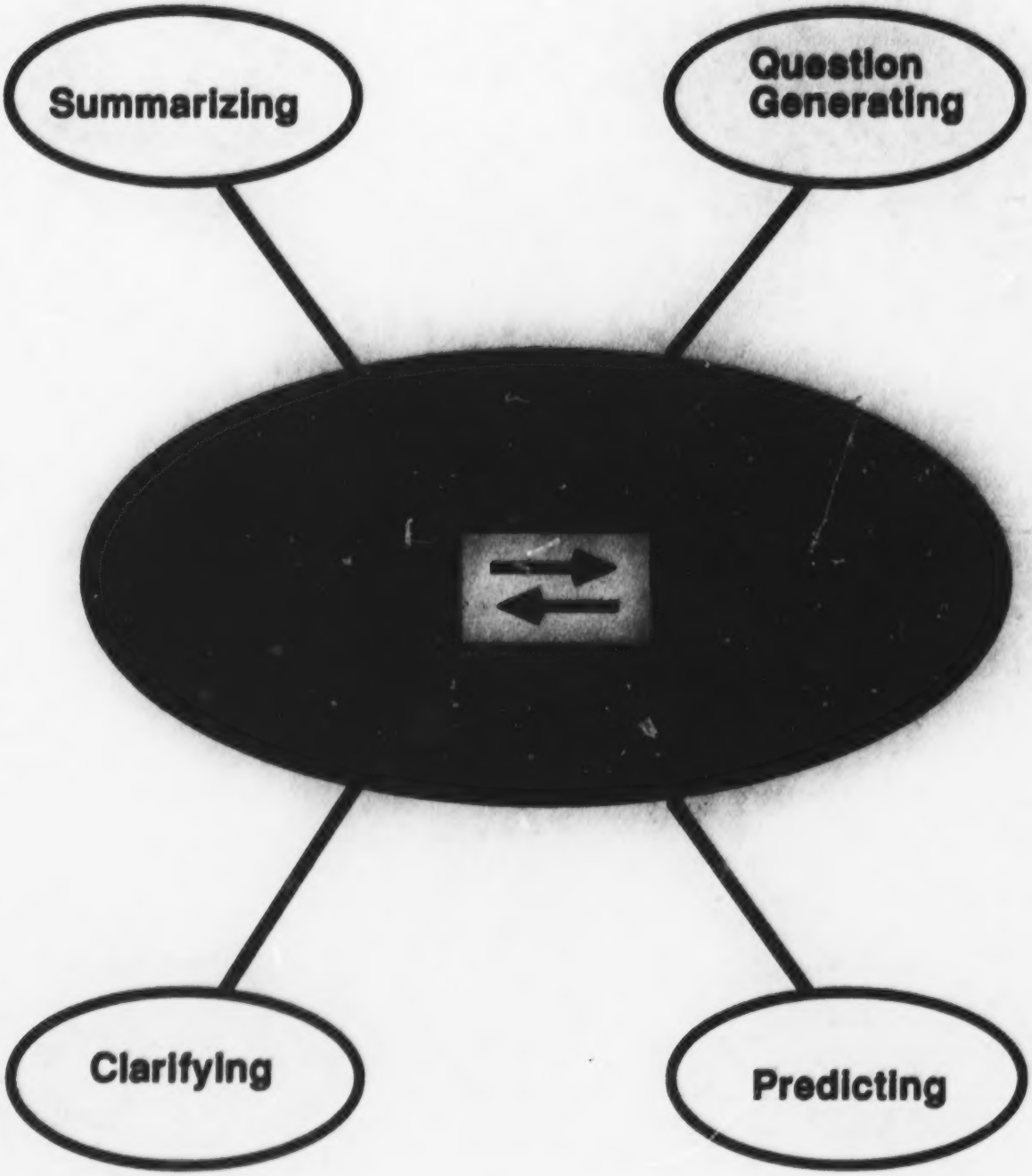


Step 5: ***Review & Extend***

Analysis

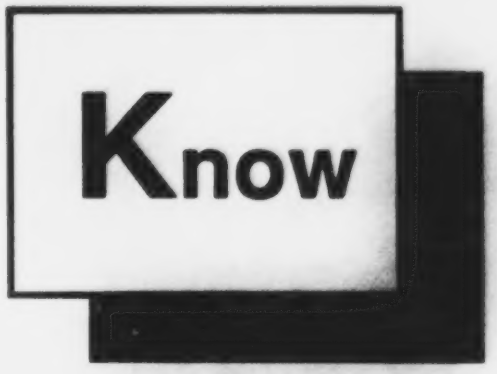


Transparency 31

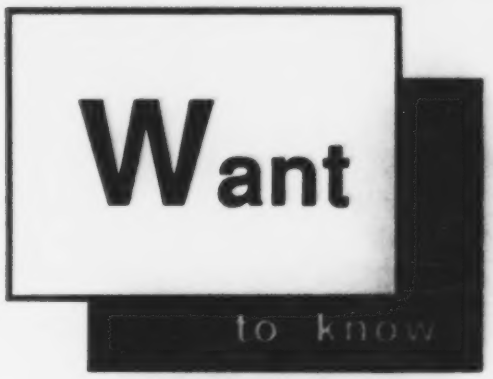


Transparency 32

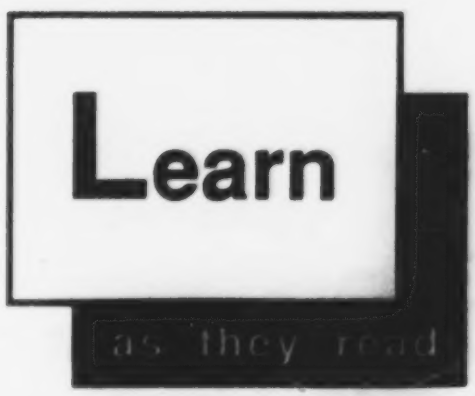
recalling what they



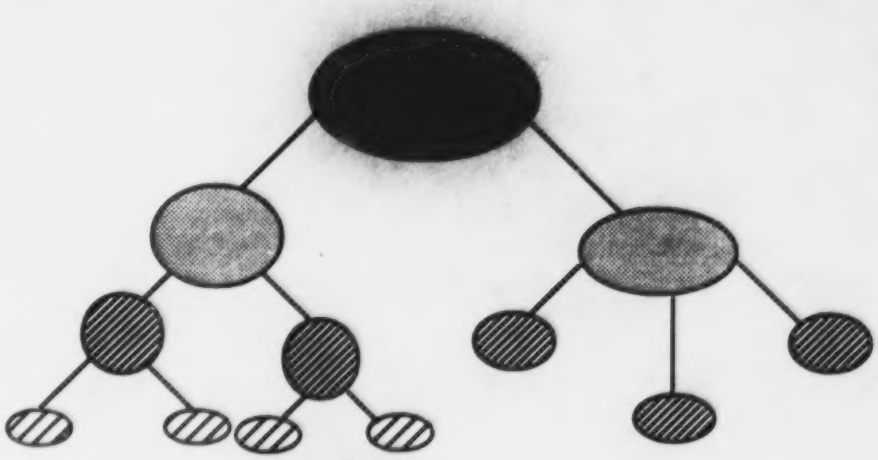
determining what they



identifying what they



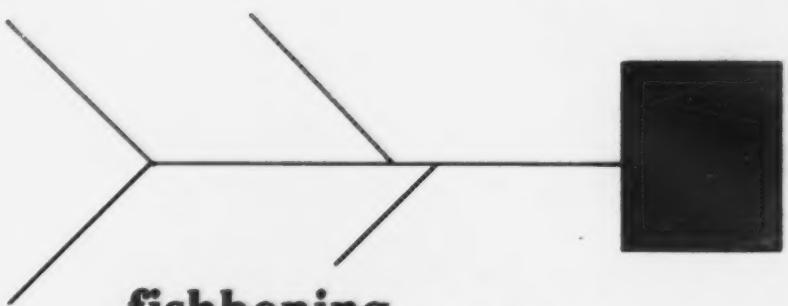
Transparency 33



treeing

Semantic Mapping

clustering



fishboning

Transparency 34

Creating a Climate for Thinking

Listening to Students

Appreciating Individuality and Openness

Encouraging Open Discussion

Promoting Active Learning

Accepting Students' Ideas

Allowing Time to Think

Nurturing Confidence

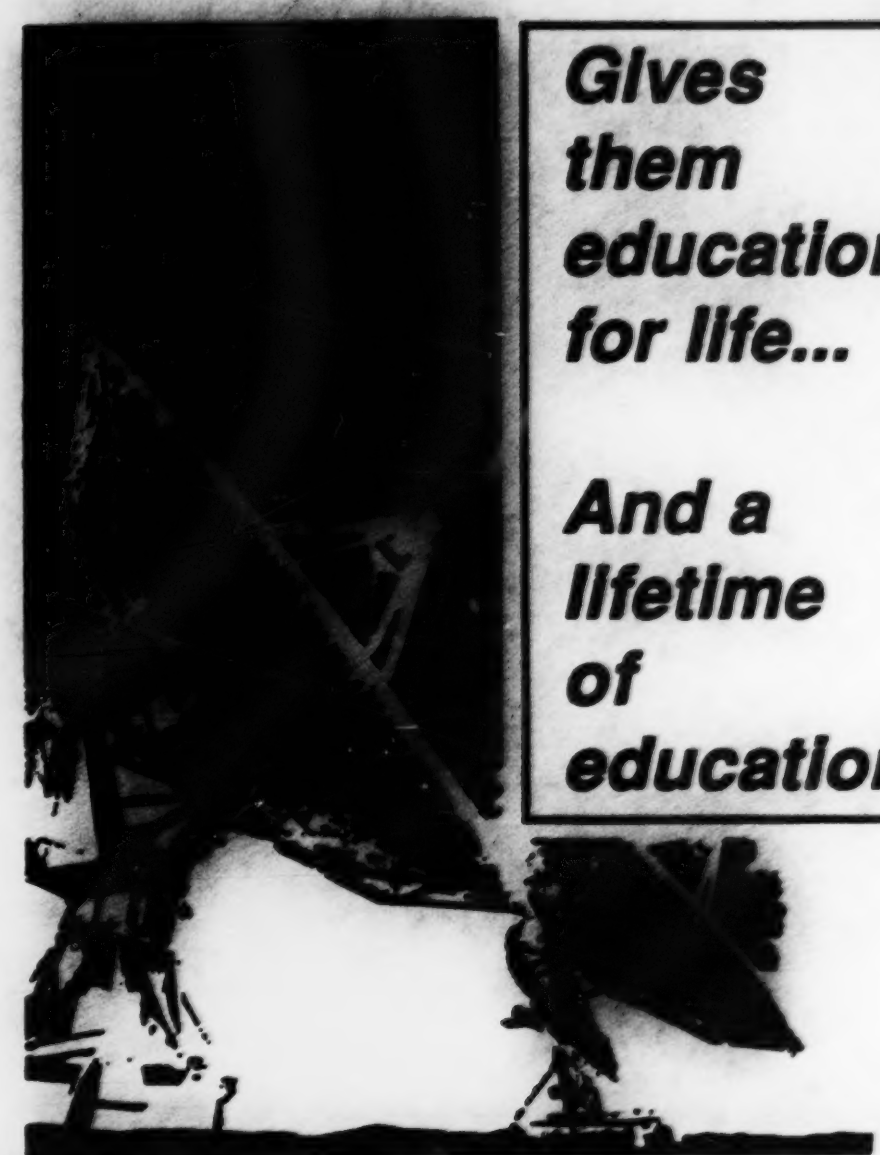
Giving Facilitative Feedback

Appreciating Student's Ideas

Source:
Raths, Louis E. et al., Teaching for Thinking:
Teachers College, Columbia University, N.Y. N.Y. 1986

Transparency 35

Empowering students to think

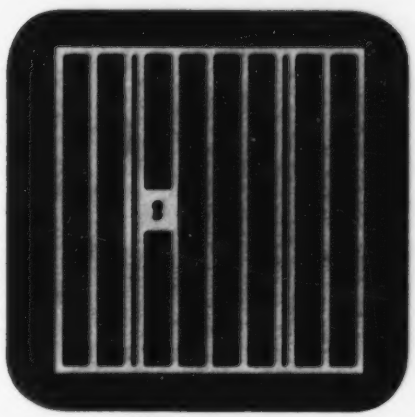


Gives them education for life...

And a lifetime of education.

Transparency 36

"None of this is easy. Our own history is our enemy."



Transparency 37

"But times change. This could be the year that 'thinking goes to school'."

Source: Raths, et.al., Teaching for Thinking

Transparency 38

And Remember...

Transparency 39

ADVANCED SKILLS WORKSHOP

Bibliography

Abercrombie, M.L.J. (1960). Anatomy of judgment. New York: Basic Books.

Abrahams, R.D. & Troike, R.C., (Eds.), (1972). Language and cultural diversity in American education. Englewood Cliffs, NJ: Prentice-Hall.

Action for excellence: A comprehensive plan to improve our nation's schools. (1983). Denver, CO: Education Commission of the States.

Activities to promote critical thinking: Classroom practices in teaching English. (1986). Urbana, IL: National Council of Teachers of English.

Approaches to teaching thinking (audiotape). Alexandria, VA: Association for Supervision and Curriculum Development.

Barnes, D., Burgdorf, A., & Wench, L.S. (1987). Critical thinking: Reading, thinking, and reasoning skills (levels 1-6). Austin, TX: Steck-Vaughn Company.

Bartholomae, D., & Petrosky, A. (1986). Facts, artifacts and counterfacts: Theory and method for a reading and writing course. Upper Montclair, NJ: Boynton/Cook.

Bartlett, F. (1958). Thinking. New York: Basic Books.

Berthoff, A.E. (1978). Forming/thinking/writing: The composing imagination. Rochelle Park, NJ: Hayden.

Beyer, B.K. (1987). Practical strategies for the teaching of thinking. Boston: Allyn and Bacon.

Birman, B.F., Orland, M.E., Jung, R.K., Anson, R.J., & Garcia, G.N. (1987). The current operation of the Chapter 1 program. Washington, DC: Office of Educational Research and Improvement, U.S. Department of Education.

Bloom, B.S. (1956). Taxonomy of educational objectives: Part 1, cognitive domain. New York: Longmans Green.

Bloom, B.S., Hasting, T., & Madaus, G.F. (1971). Handbook on formative and summative evaluations of student learning. New York: McGraw-Hill.

Brown, A.L. (October 1984). Teaching students to think as they read: Implications for curriculum reform. Paper commissioned by the American Educational Research Association Task Force on Excellence in Education.

Brubaker, S.H. (1983). Workbook for reasoning skills: Exercises for cognitive facilitation. Detroit: Wayne State University Press.

Building Thinking Skills Series for K-12. (1988). Pacific Grove, CA: Midwest Publications.

Carter, C., & Rashkis, Z. (1980). Ideas for teaching English in the junior high and middle school. Urbana, IL: National Council of Teachers of English.

Chance, P. (1985). Thinking in the classroom: A survey of programs. New York: Teachers College Press, Columbia University.

Commeyras, M. (1989). Analyzing a critical-thinking reading lesson. (Technical Report No. 464). Champaign, IL: Center for the Study of Reading, University of Illinois.

Cosin, B. and others (1972). School and society: A sociological reader. Cambridge, MA: MIT Press.

Covington, M. (1985). Strategic thinking and the fear of failure. In J.W. Segal and others, (Eds.), Thinking and learning skills, Vol. 1: Relating instruction to research. Hillsdale, NJ: Erlbaum.

Covington, J., & Berry, R. (1976). Self-worth and school learning. New York: Holt, Rinehart and Winston.

Crabbe, A.B. (September 1989). The future problem-solving program. Educational Leadership, 47, 27-29.

CRITTOURS-Adventures in critical thinking and cooperative learning (series, grades 3-9). Topeka, KS: Econo Clad Books.

Curcio, F.R. (1987). Teaching and learning: A problem-solving focus. Reston, VA: National Council of Teachers of Mathematics.

de Bono, E. (1966). Six thinking hats. Boston: Little, Brown.

de Bono, E. (1970). Lateral thinking: A textbook of creativity. Harmondsworth, England: Penguin Books.

Darrow, H. (1986). Independent activities for creative learning. New York: Teachers College Press, Columbia University.

Deneen, J.R. (1987). Developing critical thinking skills (videotape). Instructivision and NASSP, available through Research for Better Schools, Philadelphia, PA.

Dewey, J. (1910). How we think. Boston: D.C. Heath.

Dixon, L. (1984). Project turn around: Eighteen classroom activities designed to help students eliminate self-defeating behaviors and attitudes. Manhattan, KS: The MASTER Teacher.

Doll, W.E., Jr. (September 1989). Complexity in the classroom. Educational Leadership, 47, 65-70.

Donovan, T., & McClelland, B.W., (Eds.), (1980). The epistemic approach: Writing, knowing, and learning. Eight approaches to teaching composition. Urbana, IL: National Council of Teachers of English.

Downie, D., Slesnick, T., & Stenmark, J.K. (1983). Math for girls and other problem solvers. Berkeley: Math/Science Network, University of California.

Duke, C.R. (1984). The role of reflection, problem solving and discussion in the teaching of literature. Urbana, IL: ERIC Clearinghouse on Reading and Communication Skills.

Dyer, P. (1985). A study of the effect of prereading mapping on comprehension and transfer learning. (Doctoral Dissertation). University of California at Berkeley.

Education Commission of the States (1981). National Assessemnt of Educational Progress. Reading, thinking and writing: Results from the 1979-80 National Assessment of reading and literature. Denver: Education Commission of the States.

Flower, L. (1989). Problem-solving strategies for writing. San Diego: Harcourt Brace Jovanovich.

Floyd, A., (Ed.), (1981). Developing mathematical thinking. London: Addison-Wesley.

Feuerstein, R. (1979). Instructional enrichment. Baltimore: University Park Press.

Fraenkel, J.R. (1973). Helping students think and value. Englewood Cliffs, NJ: Prentice-Hall.

Frager, A. (October 1984). Conflict: The key to critical reading instruction. Paper presented at annual meeting of The Ohio Council of the International Reading Association Conference, Columbus, OH.

Gage, N.L., & Berliner, D.C. (November 1989). Nurturing the critical, practical, and artistic thinking of teachers. Phi Delta Kappan, 71, 212-214.

Gardner, D.P. et al. (1983). A nation at risk: The imperative for educational reform. An open letter to the American people. A report to the Nation and the Secretary of Education. Washington, DC: National Commission on Excellence in Education.

George, H.V. (1972). Common errors in language learning. Rowley, MA: Newbury House.

Ginsburg, H., & Opper, S. (1969). Piaget's theory of intellectual development: An introduction. Englewood Cliffs, NJ: Prentice-Hall.

Glazer, S.M., Searfoss, L.W., & Gentile, L.M., (Eds.), (1989). Reexamining reading diagnosis: New trends and procedures. Newark, DE: International Reading Association.

Gloub, J., & the NCTE Committee on Classroom Practices (1988). Focus on collaborative learning: Classroom practices in teaching English. Urbana, IL: National Council of Teachers of English.

Graves, D. (1983). Writing: Teachers and children at work. Exeter, NH: Heinemann.

Harris, M. (1986). Teaching one-to-one: The writing conference. Urbana, IL: National Council of Teachers of English.

Hayakawa, S.I. (1947). Language in thought and action. New York: Harcourt, Brace, Jovanovich.

Heimlich, J.E., & Pittelman, S.D. (1986). Semantic mapping: Classroom application. Newark, DE: International Reading Association.

Herrmann, N. (September 1982). The creative brain. NASSP Bulletin, 66, 31-46.

Higher order thinking skills: A catalog of products, publications, and services. (1989). Research Triangle Park, NC: Southeastern Educational Improvement Laboratory.

Hunt, J. M. (1961). Intelligence and experience. New York: Ronald Press.

Inhelder, B., & Piaget, J. (1964). The early growth of logic in the child. Translated by E.A. Lunzer & D. Papert. New York: W.W. Norton and Co.

Johnson, D.W., & Johnson, R.T. (Winter 1979). Conflict in the classroom: Controversy and learning. Review of Educational Research, 49, 51-70.

Johnson, L.L. (March 1989). Learning across the curriculum with creative graphing. Journal of Reading, 32, 509-519.

Judd, C.H. (1936). Education as cultivation of the higher mental processes. New York: Macmillan.

Keating, D. (1988). Adolescents' ability to engage in critical thinking. Madison, WI: National Center of Effective Secondary Schools.

Knapp, M.S., & Turnbull, B.J. (1990). Better schooling for the children of poverty: Alternatives to conventional wisdom. Study of academic instruction for disadvantaged students. Volumes I & II. Washington, DC: U.S. Department of Education, Office of Planning, Budget & Evaluation.

Krulik, S., & Rudnick, J.S. (1987). Problem solving: A handbook for teachers. Boston: Allyn and Bacon.

Kruse, J. (1988). Classroom activities in thinking skills. Philadelphia, PA: Research for Better Schools.

Kruse, J. & Presseisen, B.A. (1987). A catalog of programs for teaching thinking. Philadelphia, PA: Research for Better Schools.

Lawrence, M.S. (1974). Writing as a thinking process. Ann Arbor: University of Michigan Press.

Levin, H.M. (1987). New schools for the disadvantaged. Denver, CO: Mid-Continent Regional Educational Laboratory (McREL).

Link, F.R., & Almquist, S. (1987). Thinking to write: A student journal program. Published by Curriculum Development Associates. Available from Research for Better Schools, Philadelphia, PA.

Lipman, M. (September 1988). Critical thinking - What can it be?" Educational Leadership, 46, 38-43.

Lochhead, J., & Clement, J., (Eds.), (1979). Cognitive process instruction: Research on teaching thinking skills. Philadelphia: The Franklin Institute Press.

Lowery, L.F. (1989). Thinking and learning: Matching developmental stages with curriculum and instruction. Pacific Grove, CA: Midwest Publications.

Macrorie, K. (1970). Uptaught. New York: Hayden.

Marzano, R.J., Brandt, R.S., Hughes, C.S., Jones, B.F., Presseisen, B.Z., Rankin, S.C., & Suhor, C. (1989). Dimensions of thinking: A framework for curriculum and instruction. Alexandria, VA:
Association for Supervision and Curriculum Development.

Maysfield, M. (1987). Thinking for yourself: Developing critical thinking skills through writing. Belmont, CA: Wadsworth Publishing Company.

McPhail, E. C. (1983). Motivation plus: A complete program of attitude education. Manhattan, KS: The MASTER Teacher.

Moffett, J. (1968). Teaching the universe of discourse. Boston: Houghton Mifflin.

National Forum Magazine. (Critical Thinking Issue). Winter, 1985. The Honor Society of Phi Delta Phi.

National Forum Magazine. (Curricular Reform Issue). Summer, 1987. The Honor Society of Phi Kappa Phi.

Nelson, R.C. (April 1989). Of robins' eggs, teachers, and education reform. Phi Delta Kappan, 632-638.

Neilsen, A.R. (1989). Critical thinking and reading: Empowering learners to think and act. (Monograph on Critical Thinking No. 2). Bloomington, IN: ERIC Clearinghouse on Reading and Communcation Skills and the National Council of Teachers of English.

Nickerson, R.S. (1986). Reflections on reasoning. Hillsdale, NJ: Lawrence Erlbaum Associates.

Norris, S.P. (1989). Verbal reports of thinking and multiple-choice critical thinking test design. (Technical Report No. 447). Champaign, IL: Center for the Study of Reading, University of Illinois. Also Cambridge, MA: Bolt, Beranek and Newman.

Odyssey: A curriculum for thinking. Program includes individual publications: Foundations of reasoning, verbal reasoning, problem solving, decision making, inventive thinking. Watertown, MA: Mastery Education.

O'Reilly, K., & Aplaine, J. (1987). Critical viewing: Stimulant to critical thinking. South Hamilton, MA: Critical Thinking Press.

Papert, S. (1980). Mindstorms. New York: Basic Books.

Paul, R., Binker, A.J.A., & Charbonneau, M. (1986). Critical thinking handbook: A guide for remodeling lesson plans in language arts, social studies, and science. Rohnert Park, CA: Center for Critical Thinking and Moral Critique, Sonoma State University.

Perkins, D.N. (1986). Knowledge as design. Hillsdale, NJ: Erlbaum Associates.

Piaget, J. (1960). The language and thought of the child. London: Routledge.

Piaget, J. (1969). Psychology of intelligence. Totowa, NJ: Littlefield, Adams, and Company.

Pierce, J.C. (1971). The magical child. New York: E.P. Dutton.

Pogrow, S. (January 1990). Challenging at-risk students: Findings from the HOTS program. Phi Delta Kappan, 389-397.

Presseisen, B.A., (Ed.), (1988). At-risk students and thinking: Perspectives from research. National Education Association. (Available from Research for Better Schools, Philadelphia, PA.)

Presseisen, B.A. (1986). Critical thinking and thinking skills: State of the art definitions and practice in public schools. Philadelphia, PA: Research for Better Schools.

Presseisen, B.A., (Ed.), (1988). The development of adolescent thinking: Some views for effective schools. Philadelphia, PA: Research for Better Schools.

Rajagopal, D. (1964). Think on these things. New York: Harper & Row.

Raths, L.E., & Burrell, A.P. (1972). Meeting the needs of children. Columbus, OH: Charles E. Merrill.

Raths, L. E., Wassermann, S., Jonas, A., & Rothstein, A. (1986). Teaching for thinking: Theory, strategies and activities for the classroom. New York: Teachers College, Columbia University.

Reader's Digest. (1980). Tests and teasers. Pleasantville, NY: The Reader's Digest Association.

Resnick, L.B. (1987). Education and learning to think. Washington, DC: National Academy Press.

Resnick, L.B. & Klopfer, L.E. (1989). Toward the thinking curriculum: Current cognitive research. 1989 Yearbook. Alexandria, VA: Association for Supervision and Curriculum Development.

Restak, R.M. (1979). The brain, the last frontier. New York: Warner Books.

Rosebery, A.S. and others (1989). The problem-solving processes of writers and readers. (Occasional Paper no. 7). Berkeley, CA: Center for the Study of Writing.

Rosenberg, V.M. (1989). Reading, writing, and thinking: Critical connection. New York: Random House.

Rowan, B., Guthrie, L.F., Lee, G.V., & Guthrie, G.P. (1986). The whole school day study. The design and implementation of Chapter 1 instructional services: A study of 24 schools. San Francisco: Far West Laboratory for Educational Research and Development.

Ruggiero, V. (1988). The art of thinking: A guide to critical and creative thought. New York: Harper and Row.

Ruggiero, V. (1989). Critical thinking: A supplement to becoming a master student. Rapid City, SD: College Survival, Inc.

Shaughnessy, M.P. (1979). Errors and expectations: A guide for the teacher of basic writing. New York: Oxford University Press.

Siegel, M. & Carey, R. (1989). Critical thinking: A semiotic perspective (Monograph on Critical Thinking No. 2). J.C. Harste, (Ed.), Bloomington, IN: ERIC Clearinghouse on Reading and Communication Skills and the National Council of Teachers of English.

Smith, C.B. (February 1989). Prompting critical thinking. Reading Teacher, 42, 424.

Stiggins, R. J., Rubel, E., & Quellmalz, E. (1988). Measuring thinking skills in the classroom. Washington, DC: NEA Professional Library.

Study skills: A ready reference for teachers. (1988). Hawaii State Department of Education, Office of Instructional Services, Honolulu, HI.

Swartz, C.E. (1988). Critical thinking in science: The power of the quantitative (videotape). State University of New York at Stoney Brook.

Tama, M.C. (October 1989). Critical thinking has a place in every classroom. Journal of Reading, 33.

Teaching thinking: A new focus for education. RBS Project Brief, No. 2. Philadephia, PA: Research for Better Schools.

Teaching thinking and problem solving (bi-monthly newsletter). Hillsdale, NJ: Lawrence Erlbaum Associates.

Thinking Skills Project. The thinking times (newsletter). Aurora, Colorado: Community College of Aurora.

Thomas, R.G., (Ed.), (1987). Higher order thinking: Definition, meaning and instructional approaches. Washington, DC: Home Economics Education Association.

Tiedt, I.M., Carlson, J.E., Howard, B.D., & Watanabe, K.S.O.(1989). Teaching thinking in K-12 classrooms: Ideas, activities, and resources. Boston: Allyn and Bacon.

Tierney, R.J., Readance, J.E., & Dishner, E.K. (1986). Reading strategies and practices: Guide for improving instruction. Boston: Allyn and Bacon.

Tierney, R.J. and others. (Spring 1989). The effects of reading and writing upon thinking critically. Reading Research Quarterly, 24, 134-173.

Teaching to think: A new emphasis. (1983, Jan.9) Education: Winter Survey. The New York Times, Section 12, pp. 1, 37-41.

Thacker, R. J., Novosel, J., Anderson, G. W., & Wolfe, M. Indiana critical and creative thinking project. Indianapolis, Indiana: Indiana Department of Education Teacher Quality Program.

Tobin, K. (Spring 1987). The role of wait time in higher cognitive level learning." Review of Educational Research, 57, 69-75.

Vygotsky, L. (1962). Thought and language. Translated by E. Hanfman and G. Vakar. Cambridge, MA: MIT Press.

Wasserman, S. (1978). The primary thinking box. San Diego: Coronado.

Wasserman, S. (1978). Put some thinking in your classroom. San Diego: Coronado.

Wasserman, S., & Raths, L.E. (1984). Thinking and learning (levels 3-6). San Diego: Coronado.

Wess, R.C. (October 1985). Creativity and composing: The composition teacher as student. Teaching English in the two-year college, 12, 191-197.

Whimbey, A. (April 1980). Students can learn to be better problem solvers. Educational Leadership, 37, 560-565.

Wilson, J. (1971). Thinking with concepts. Cambridge: At the University Press.

Worsham, A.M. & Stockton, A.J. (1986). A model for teaching thinking skills: The inclusion process. Bloomington, Indiana: Phi Delta Kappa Educational Foundation.

Writing and Thinking: A process approach. (1989). Series, grades 1-6. Watertown, MA: Mastery Education.

Writing and Thinking in Action: A classroom profile. (1988). Watertown, MA: Mastery Education.

Yellin, D. (October 1983). Left brain, right brain, super brain: The holistic model. Reading World, 23, 36-44.